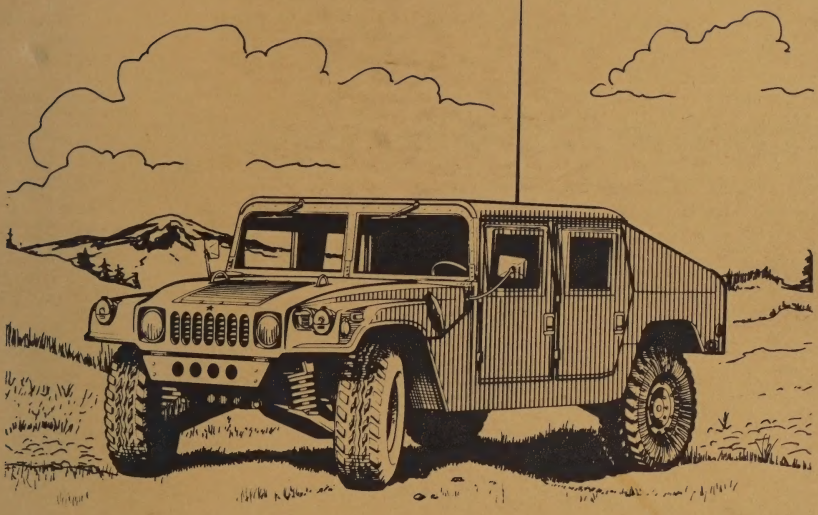
ARMY TM 11-5820-401-10-1
NAVY EE 150-JA-OP1-010-E154
AIR FORCE TO 31R2-2VRC-191

Operator's Manual

THIS PUBLICATION IS PART OF THE REFERENCE PUBLICATION SET OF THE HQS DET, 198TH MP BN AND IS NOT TO BE REMOVED FROM THE ORDERLY ROOM WITHOUT THE PERMISSION OF THE DET SGT



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RADIO SETS

AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (NSN 5820-00-223-7415), AN/VRC-44 (NSN 5820-00-223-7417), AN/VRC-45 (NSN 5820-00-223-7418), AN/VRC-46 (NSN 5820-00-223-7433), AN/VRC-47 (NSN 5820-00-223-7434), AN/VRC-48 (NSN 5820-00-223-7435), AND AN/VRC-49 (NSN 5820-00-223-7437) (USED WITHOUT INTERCOM SYSTEMS)

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE

15 JANUARY 1986

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER
3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL
4. SEND FOR HELP AS SOON AS POSSIBLE
5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

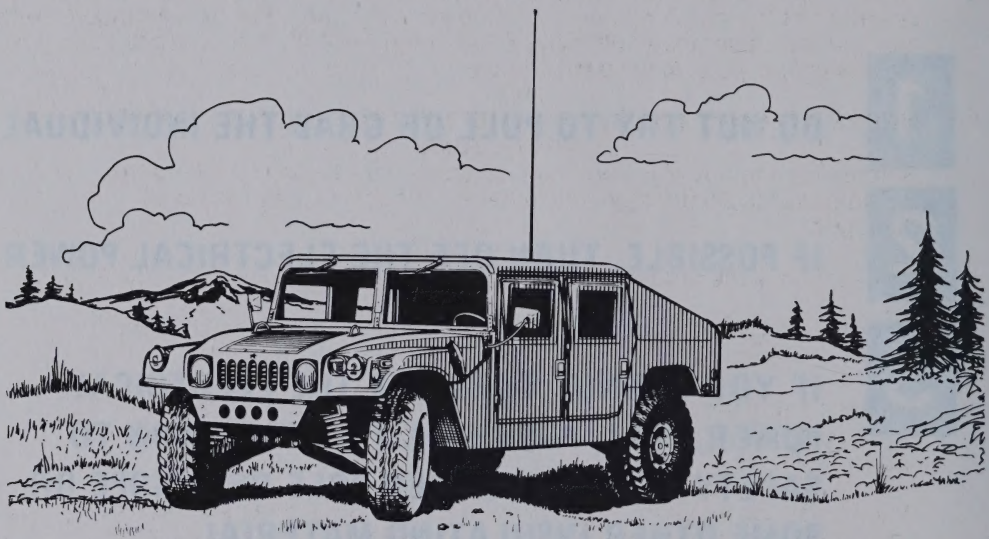
WARNING

Serious injury or even death can happen if the following are not carefully observed when installing and using the antennas used with your radio sets.

BEFORE ANY MISSION, FIND OUT

1. Are there any power lines in your area of operation?
2. How low are these power lines?

MOBILE OPERATION WITH WHIP ANTENNAS



DO NOT STOP YOUR VEHICLE UNDER POWER LINES

WARNING

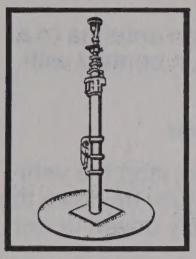
High Voltage is used in the operation of the Receiver-Transmitters RT-524/VRC and RT-246/VRC. Death on contact can result so observe the following safety precautions.

Do not touch or stand within 20 inches (0.5 meters) of an RT's antenna when there is a possibility that the RT could be transmitting.

If at all possible, work on the equipment only when another person is nearby who is competent in cardiopulmonary resuscitation (CPR) and the five safety steps of page A.

Do not be misled by the terms "low voltage" and "low potential." Voltages/potentials as low as 50 volts can cause death under certain conditions.

FIXED OPERATION WITH ELEVATED ANTENNAS



TELESCOPING ANTENNA MAST

WARNING

ELEVATED ANTENNA

NEVER ERECT ELEVATED ANTENNAS DIRECTLY UNDER POWER LINES.

If you must erect elevated antennas near power lines, power line poles or towers, or buildings with overhead power line connections, never put the antenna closer than TWO TIMES the antenna height from the base of the power line, pole, tower or buildings.

NEVER ATTEMPT TO ERECT ANY ELEVATED ANTENNA WITHOUT A FULL TEAM

Before erecting any elevated antenna, inspect all the parts making up the antenna kit. Do not erect the antenna if any parts are missing or damaged.

Do as much of the assembly work as possible on the ground.

When erecting the antenna, allow only team personnel in the erection area.

Make sure that the area for the anchors is firm. If the ground is marshy or sandy, get specific instructions from your supervisor on how to reinforce the anchors.

When selecting locations for anchors, avoid traveled areas and roads. If you cannot avoid these areas, get specific instructions from your supervisor as to what clearance your guy wires and ropes must have over the traveled areas and road.

Clearly mark all guy wires and ropes with the warning flags or signs supplied by your unit. In an emergency, use strips of white cloth as warning streamers.

If you suspect that power lines have made accidental contact with your antenna, stop operating, rope off the antenna area, and notify your superiors.

If the weather in your area can cause ice to form on your elevated antenna and its guy wires and ropes, add extra guys to support the system. Rope off the area and post it with warning signs like "BEWARE OF FALLING ICE."

Do not erect any antenna during an electrical storm.

Keep a sharp eye on your anchors and guys. Check them daily and immediately before and after bad weather.

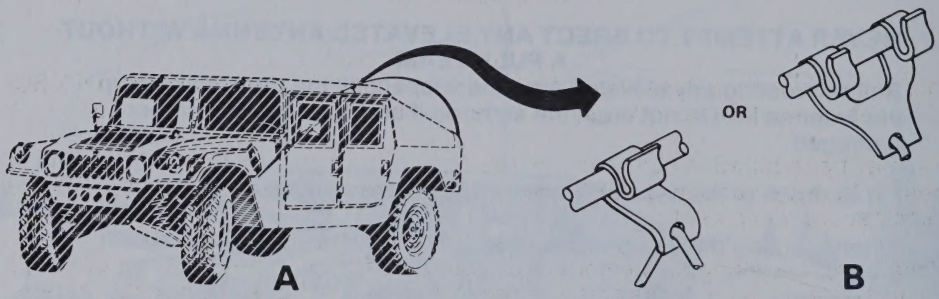
WARNING

High voltage can be encountered when a communication antenna of a vehicle strikes a power line. Death to persons inside, or in contact with, the vehicle can result. To reduce this hazard:

Do not stop or park a vehicle under any type of power line.

If you are not sure that an antenna will clear a power line, stop the vehicle before getting close to the power line and then carefully tie down the antenna elements to ensure that the vehicle can be safely driven under the power line.

Vehicles with antennas that have two or more antenna elements (auxiliary receiver antennas and/or RT Antennas AT-912/VRC and AS-1729/VRC) will probably strike railroad and/or streetcar power (trolley) lines unless the antenna elements are correctly tied down as in A below. To reduce the risk of an antenna element coming loose from its tie-down clamp, the clamp must be secured to the upper antenna element as in B below.



If possible, try to maintain communications with the vehicle antennas tied down.

WARNING

Death or serious injuries can result:

When antenna tip caps are not installed on the upper element of antennas that are to be tied down.

When a tied down antenna strikes a fixed object such as an overhead bridge, tree limb, and so forth. Outside persons may be struck by flying antenna parts.

WARNING

Serious injury can result from lifting too heavy an object. As a general rule, do not attempt to lift alone an object that exceeds one-third (⅓) of your body weight. An object of such weight is considered a two-person lift item. An RT-524 and RT-246 each weigh a little more than 60 pounds.

CAUTION

Throughout this manual, there are cautions that must be observed when doing specific procedures to avoid possible damage to the equipment. Read each caution carefully and then adhere to appropriate safety procedures when doing the work.

HOW TO USE THIS MANUAL

- This technical manual tells about the typical arrangement and use of the AN/VRC-12 Series of eight Radio Sets used without intercom equipment.
- You may be required to use voice-secure equipment (VINSON COMSEC equipment) with these radio sets. TM 11-5810-312-12 covers the hookup and use of this voice-secure equipment.
- While using this manual, remember that your mission and type of vehicle or installation will determine the types and number of audio accessories authorized, antennas used, cable installation and routing, and the physical location of the equipment.
- The appendixes in the back of this manual list the various components that can be used with this equipment. Use the Department of Army Supply Bulletin (SB 11-131) to identify the various harnesses, installation kits and accessory kits authorized for your installation.
- Keep your TM with the equipment at all times.
- Protect your TM against damage and mutilation.
- Use the content of page ii to quickly locate general information.
- Use the index starting with page Index-1 after the glossary to locate specific information.
- For ready references to equipment identification, maintenance and reporting, see front cover captions.

*ARMY TM 11-5820-401-10-1
NAVY EE 150-JA-OP1-010-E154
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TECHNICAL MANUAL
NO. 11-5820-401-10-1
TECHNICAL MANUAL
NO. EE150-JA-OPI-010/E154
TECHNICAL ORDER
NO. TO 31R2-2VRC-191

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
Washington, DC, 15 January 1986

Operator's Manual

RADIO SETS
AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (NSN 5820-00-223-7415), AN/VRC-44 (NSN 5820-00-223-7417), AN/VRC-45 (NSN 5820-00-223-7418), AN/VRC-46 (NSN 5820-00-223-7433), AN/VRC-47 (NSN 5820-00-223-7434), AN/VRC-48 (NSN 5820-00-223-7435), AND AN/VRC-49 (NSN 5820-00-223-7437)

(USED WITHOUT INTERCOM SETS)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007.

For Navy, mail comments to the Commander, Naval Electronics Systems Command, ATTN: ELEX 8122, Washington, DC 20360.

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, T.O. 00-5-1. Forward direct to prime ALC/MST.

In either case, a reply will be furnished direct to you.

*This manual supersedes TM 11-5820-401-10-1, dated 12 February 1981, including all changes.

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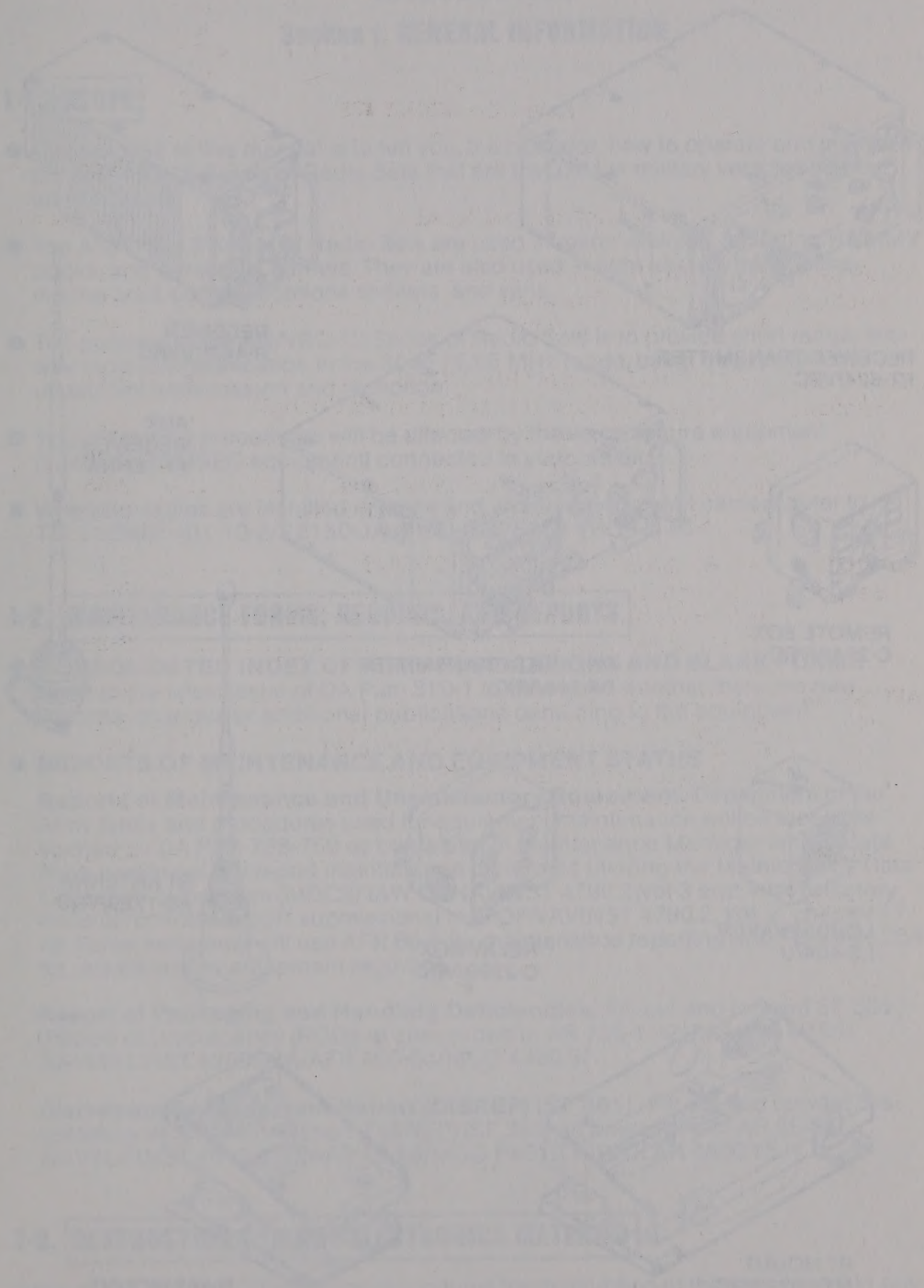
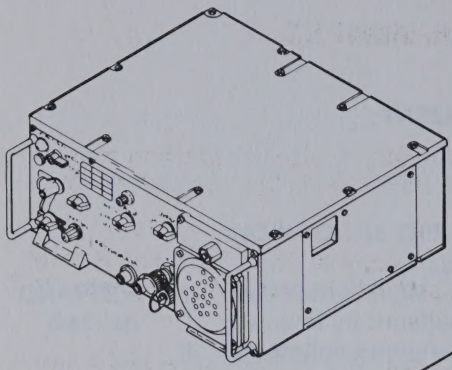
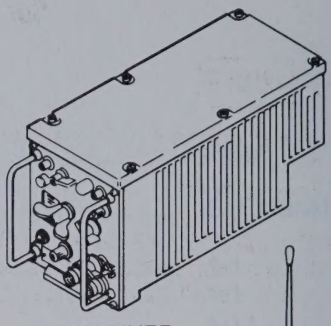


BASIC COMPONENTS OF AN/VRC-12 SERIES OF RADIO SETS WITHOUT INTERCOM SETS

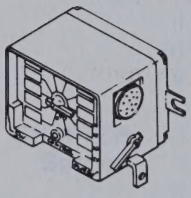


RECEIVER-TRANSMITTER
RT-524/VRC

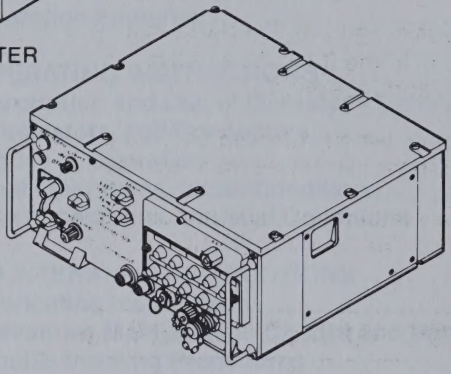


RECEIVER
R-442(*)/VRC

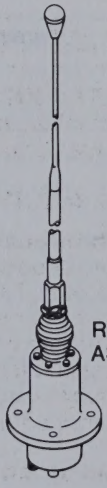
AUX
RECEIVER
ANTENNA



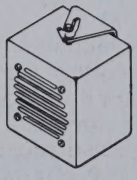
REMOTE BOX
C-2742/VRC



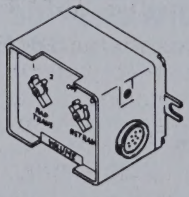
RECEIVER-TRANSMITTER
RT-246/VRC



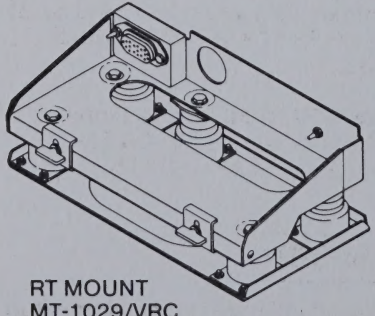
RT ANTENNA
AS-1729/VRC



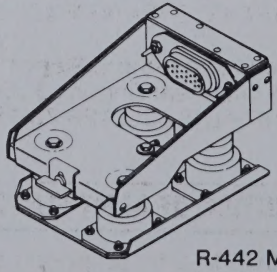
LOUDSPEAKER
LS-454/U



RELAY BOX
C-2299/VRC



RT MOUNT
MT-1029/VRC



R-442 MOUNT
MT-1898/VRC

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

- The purpose of this manual is to tell you, the operator, how to operate and maintain the AN/VRC-12 Series of Radio Sets that are installed in military vehicles without intercom sets.
- The AN/VRC-12 Series of Radio Sets are used in many vehicles, including HUMMV trucks, and personnel carriers. They are also used in light aircraft, helicopters, marine craft, communications shelters, and vans.
- The purpose of the AN/VRC-12 Series of Radio Sets is to provide short range, two-way radio communication in the 30 to 75.95 MHz range, using frequency modulated (fm) transmission and reception.
- Your operating procedures will be affected by the voice secure equipment (VINSON COMSEC equipment) connected to your radios.
- When the radios are installed in tanks and armored personnel carriers, refer to TM 11-5820-401-10-2/EE150-JA-MMO-020/E154 VRC 12, 43.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

- **CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS**
  Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.
- **REPORTS OF MAINTENANCE AND EQUIPMENT STATUS**

  Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790.2,Vol 3 and unsatisfactory material/conditions (UR submissions) IAW OPNAVINST 4790.2, Vol 2, chapter 17. Air Force personnel will use AFR 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting.

  Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/ NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

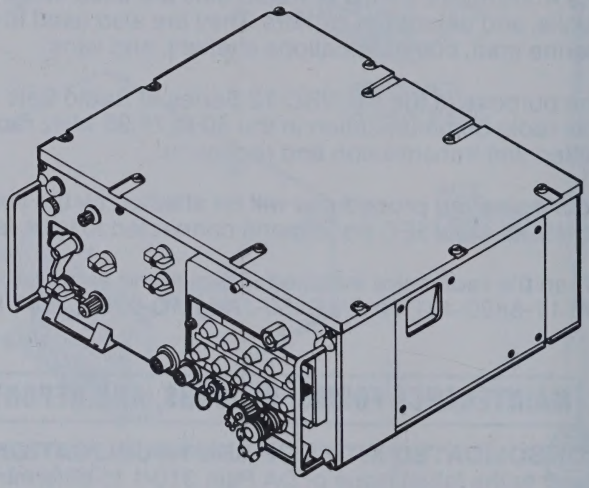
  Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/ NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1-3. DESTRUCTION OF ARMY ELECTRONICS MATERIEL

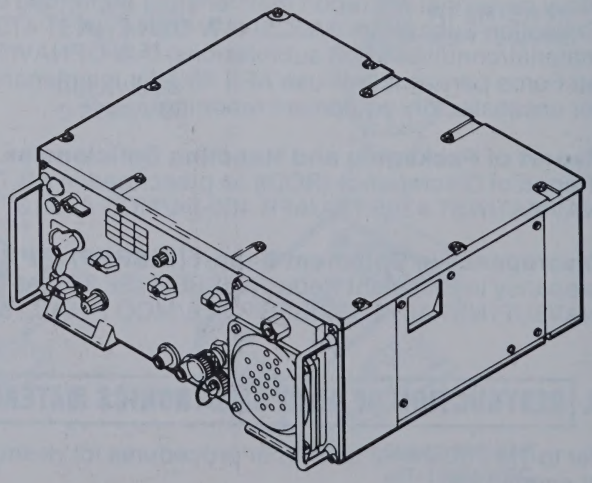
Refer to TM 750-244-2 for proper procedures for destruction of this equipment to prevent enemy use.

1-4. NOMENCLATURE CROSS-REFERENCE

Common Name	Official Nomenclature and General Application
● AN/VRC-12 SERIES of RADIO SETS	Radio Sets AN/VRC-12, AN/VRC-43 through 49.
● PUSHBUTTON RECEIVER-TRANSMITTER (RT)	Receiver-Transmitter RT-246(*)/VRC used with AN/VRC-12, AN/VRC-43, AN/VRC-44, and AN/VRC-45. Has ten push buttons for automatic tuning of preset channels.

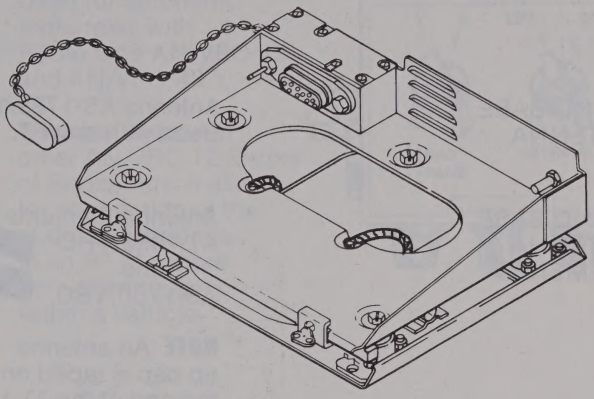


● RT or RECEIVER-TRANSMITTER WITH SPEAKER	Receiver-Transmitter RT-524(*)/VRC used with AN/VRC-46, AN/VRC-47, AN/VRC-48, and AN/VRC-49. Has a built-in loudspeaker in place of the push buttons.



1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application
● RT MOUNT	Mount MT-1029/VRC. Used with any RT of the AN/VRC-12 Series of Radio Sets.



● BOX BASE ANTENNA

Antenna AT-912/VRC. Can be used with any RT.

● BOX BASE ANTENNA ELEMENTS

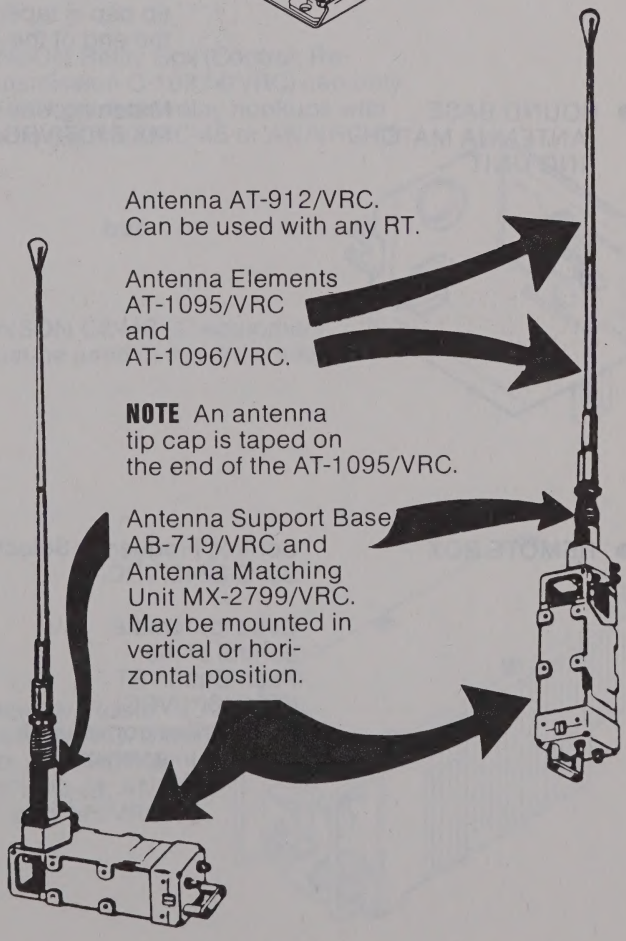
Antenna Elements AT-1095/VRC and AT-1096/VRC.

NOTE An antenna tip cap is taped on the end of the AT-1095/VRC.

● ANTENNA BASE

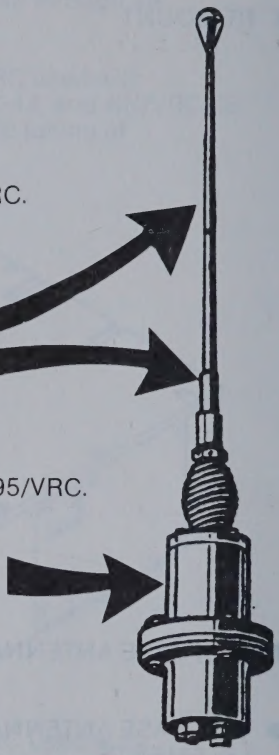
● BOX BASE ANTENNA MATCHING UNIT

Antenna Support Base AB-719/VRC and Antenna Matching Unit MX-2799/VRC. May be mounted in vertical or horizontal position.

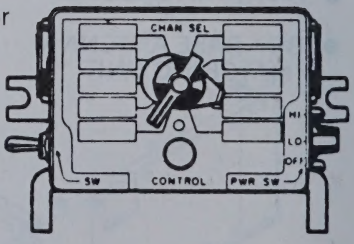


1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application
● ROUND BASE ANTENNA	Antenna AS-1729/VRC. Used with any RT.
● ROUND BASE ANTENNA ELEMENTS	Antenna Elements AT-1095/VRC and AS-1730/VRC.
	NOTE An antenna tip cap is taped on the end of the AT-1095/VRC.
● ROUND BASE ANTENNA MATCHING UNIT	Matching Unit-Base MX-6707/VRC.

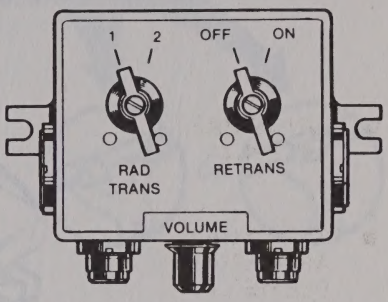


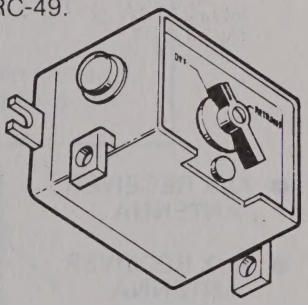
● REMOTE BOX	Control, Frequency Selector Set C-2742/VRC. Used for remote control of the Push Button RT (RT-246(*)/VRC) from a more convenient location in a vehicle.

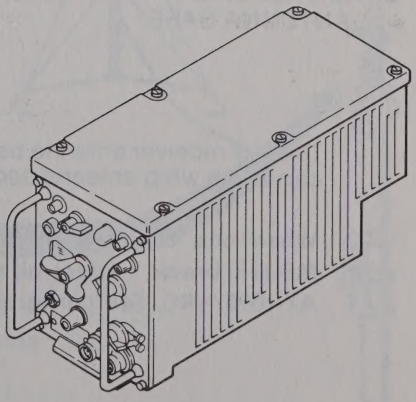


1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application
● RELAY BOX	Control Radio Set C-2299/VRC. Used for automatic radio relay with Radio Sets AN/VRC-45 and AN/VRC-49. It is also used with other AN/VRC-12 Series of Radio Sets. It allows for connection of the audio accessories to an RT at a more convenient location within a vehicle.
● VINSON RELAY BOX	VINSON Relay Box (Control, Retransmission C-10374/VRC) can only be used in radio relay hookups with Radio Set AN/VRC-45 or AN/VRC-49. **but** VINSON COMSEC equipment must be used in the radio sets.
● AUX RECEIVER	Receiver, Radio R-442(*)/VRC. Used with AN/VRC-12, AN/VRC-44, AN/VRC-47, and AN/VRC-48.

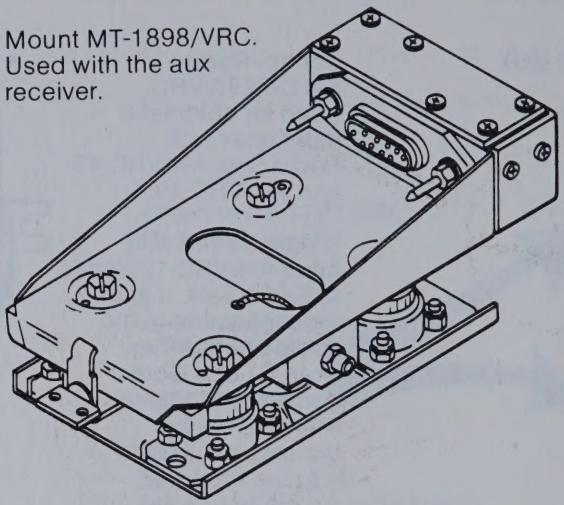


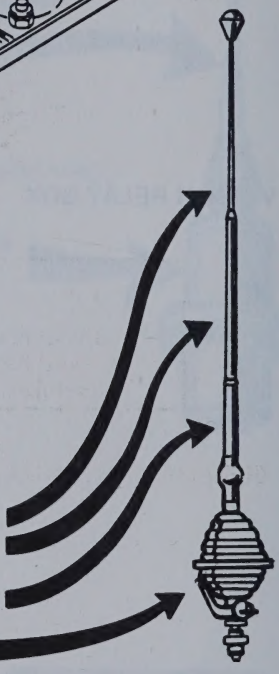




1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application
● AUX RECEIVER MOUNT	Mount MT-1898/VRC. Used with the aux receiver.
● AUX RECEIVER ANTENNA	Antenna Base AB-15/GR with 3 antenna elements.
● AUX RECEIVER ANTENNA ELEMENTS	Antenna Elements MS-118A, MS-117A, and MS-116A.
● AUX RECEIVER ANTENNA BASE	Antenna Base AB-15/GR.





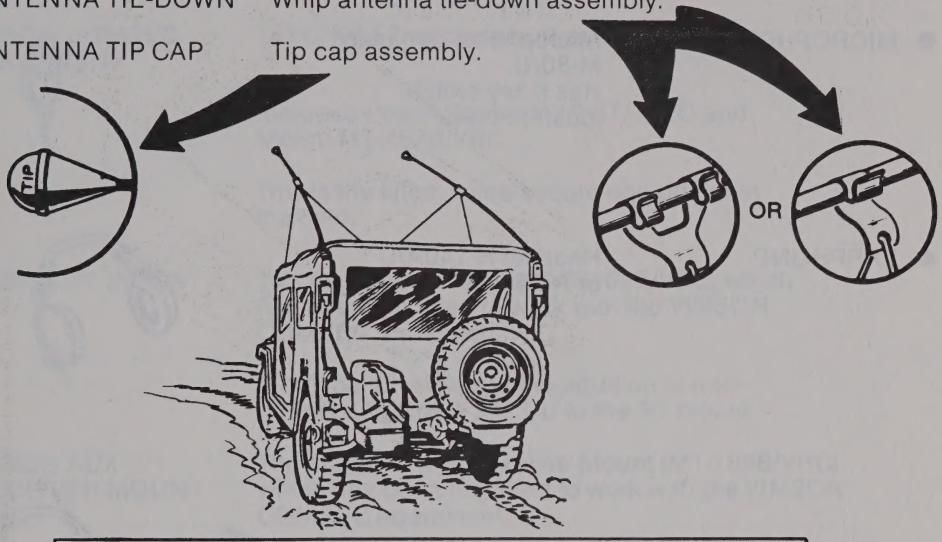
NOTE

The aux receiver antenna uses 3 elements. It also needs an antenna tip cap and a whip antenna tiedown.

When one or more of the Antenna Elements (MS-116, MS-117, or MS-118) break, replace all the antenna elements with Antenna Element AT-1095/VRC. See paragraph 1-7.

1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application
● ANTENNA TIE-DOWN	Whip antenna tie-down assembly.
● ANTENNA TIP CAP	Tip cap assembly.

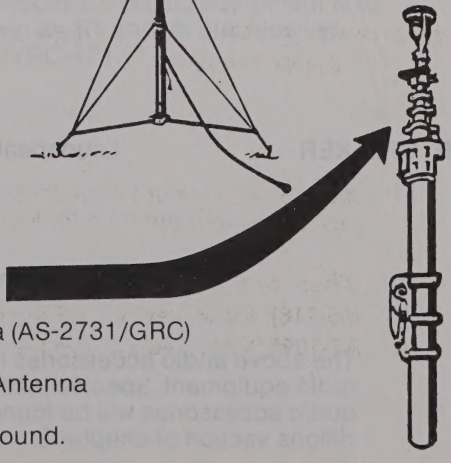


WARNING

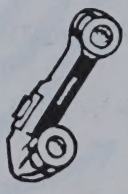
Any vehicular whip antenna that has 2 or 3 elements should have an antenna tip cap and antenna tie-down assembly.

● ELEVATED ANTENNA — Antenna Equipment RC-292 or OE-254/GRC. Used with any RT to get more range.

● TELESCOPING ANTENNA MAST — Mast AB-903/G. Used to raise the Compact Antenna (AS-2731/GRC) **or** the Round Base Antenna (AS-1729/VRC) high above the ground.



1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application	
● MICROPHONE	Microphone, Dynamic M-80/U. Has a key switch (push-to-talk).	
● EARPHONE	Headset H-140A/U or H-251/U.	
● COMBINATION HEADSET	Headset, Microphone H-161/U. Has a key switch. (push-to-talk)	
● HANDSET	Handset H-189/GR or H-250/GR. Has a key switch (push-to-talk).	
● SPEAKER	Loudspeaker LS-454/U.	

NOTE

The above audio accessories may be connected in many ways to your radio equipment. Specific instructions for connecting and using these audio accessories will be found in the Operation Under Usual Conditions section of chapter 2.

1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application
● VINSON COMSEC EQUIPMENT	TSEC/KY-57 voice-secure equipment. Includes Power Supply HYP-57/TSEC and Mount MT-4626/VRC. This is the latest voice-secure equipment in the field.
● VINSON RT MOUNT	The standard RT Mount (MT-1029/VRC) which has been modified to work with the VINSON COMSEC equipment. Modification includes the addition of interconnecting Box J-3513/U to the RT mount.
● VINSON AUX RECEIVER MOUNT	The standard Aux Receiver Mount (MT-1898/VRC) which has been modified to work with the VINSON COMSEC equipment. Modification includes the addition of interconnecting Box J-3514/U to the aux receiver mount.
● VINSON RELAY BOX	Control, Retransmission C-10374/VRC. When VINSON COMSEC equipment is involved in a radio relay (retransmission) hookup of the AN/VRC-45 or AN/VRC-49, the VINSON Relay Box is used in place of the standard Relay Box C-2299/VRC.
● VINSON SWITCH BOX	Switch, Audio Frequency SA-2171/VRC. Used when one VINSON COMSEC equipment is to be switched between an RT and an aux receiver. (AN/VRC-12 or AN/VRC-47.)

1-4. NOMENCLATURE CROSS-REFERENCE – Continued

Common Name	Official Nomenclature and General Application
● Authorized RADIO INSTALLATION KIT	Includes cables, mounts (example – RT mount), control boxes (example – C-2299 Relay Box), and other needed items.
● Authorized RADIO INSTALLATION ACCESSORY KIT (it was called COMBINATION KIT)	Includes all the cables and accessories and other items needed when another radio is to be installed in the vehicle. All items in the authorized installation accessory kit are removed from the vehicle before the vehicle is turned in.
● Authorized COMSEC INSTALLATION KIT	Includes cables and hardware needed to install VINSON COMSEC equipment in a vehicle. (See TM 11-5810-312-12-2.) All items in the authorized COMSEC Installation Kit are removed from the vehicle before the vehicle is turned in.

CAUTION

Installation kits are installed and removed by organizational maintenance personnel only.

1-5. HAND RECEIPT MANUAL

This manual has a companion document with a TM number followed by "-HR" (Hand Receipt). The TM 11-5820-401-10-1-HR provides a listing on a preprinted DA Form 2062 (Hand Receipt) of Accountable End Items/Components of End Items (COEI) and Additional Authorization List (AAL) items related to the AN/VRC-12 Series Radio Sets used in wheeled vehicles. There is a preprinted hand receipt for each radio set authorized for each type of wheeled vehicle. Each preprinted hand receipt lists the items of equipment authorized for installation, each item's National Stock Number (NSN) and the number (quantity) of any one item authorized for standard configurations. As an aid to property accountability, additional -HR manuals may be requisitioned from the US Army Adjutant General Publications Center, Baltimore, MD, in accordance with the procedures in chapter 3 AR 310-2, and DA Pam 310-10-2.

Radio set items consist of the receiver-transmitter(s) (RT's) and the antenna(s), plus the aux receiver as appropriate to the AN/VRC-12 Series Radio Set to be used with a particular vehicle.

Installation kit items consist of the receiver-transmitter mounting(s), the aux receiver mounting(s), antenna(s), and the Radio Control Boxes C-2299/VRC and C-2742/VRC, to be used with a particular vehicle and configuration. The kit also consists of headsets, handsets, microphones, loudspeakers, and other items, as appropriate to a particular vehicle.

Section II. OPERATION FEATURES

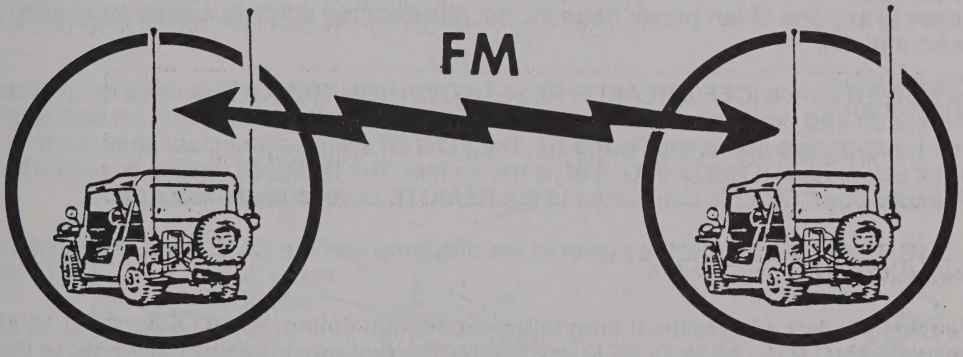
1-6. PURPOSE, CAPABILITIES, AND FEATURES OF AN/VRC-12 SERIES RADIO SETS

- The eight configurations of an AN/VRC-12 Series of Radio Sets consist of various combinations of two basic components: an FM Receiver-Transmitter (RT-246/VRC or RT-524/VRC) and an FM Auxiliary Receiver (R-442/VRC). In addition, the configurations consisting of a RT-246/VRC may have a Remote Box C-2742/VRC attached and an RT of any configuration may have a Retrans Box C-2299/VRC attached.

- This series includes Radio Sets:

AN/VRC-12	AN/VRC-46
AN/VRC-43	AN/VRC-47
AN/VRC-44	AN/VRC-48
AN/VRC-45	AN/VRC-49.

- The AN/VRC-46 and AN/VRC-49 are most common for two-way radio voice communications between vehicles.



- Frequency modulation (fm) type of radio sets.

- Transmit and receive in the frequency range of 30 to 75.95 MHz.

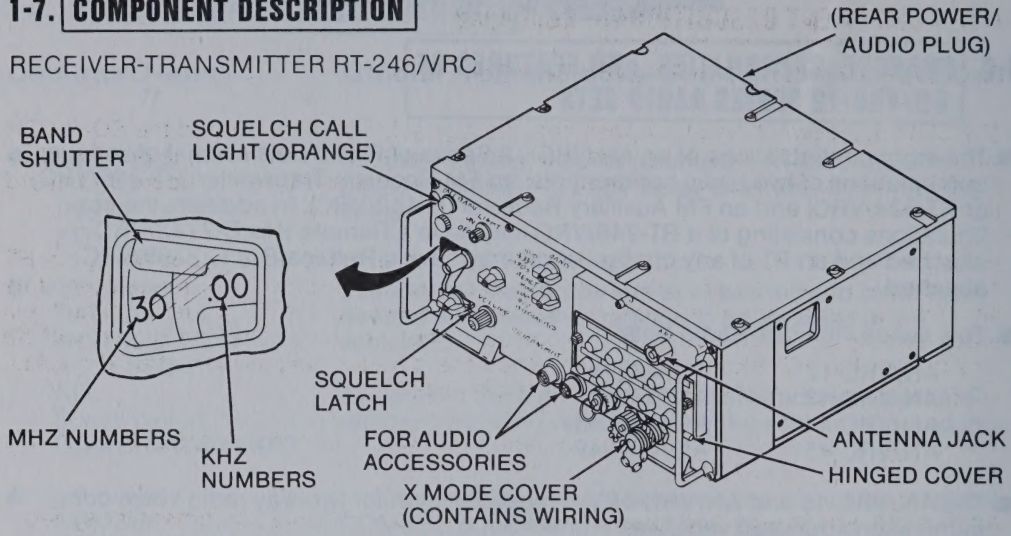
- When authorized, secure voice (X-mode) or digital data communications can be provided.

- Various types of antennas are available, depending on the mission and the communication range needed. Normally, for wheeled vehicles, an AT-912/VRC or AS-1729/VRC is used with each RT. The Antenna Base AB-15/GR, with associated antenna elements, is used with one or more auxiliary receivers.

- The vehicle's electrical system provides the 22 to 30 Vdc input operating voltage for any of the radio set configurations. The vehicle's electrical system consists of a battery pack and a charging system.

1-7. COMPONENT DESCRIPTION

RECEIVER-TRANSMITTER RT-246/VRC



The RT-246/VRC provides two-way fm radio communication on a push-to-talk/release-to-listen basis. It contains ten push buttons, which, when preset, provide automatic access to any one of ten preset frequencies. All operating controls and jacks are on the front panel.

The POWER switch (OFF-BREAKER RESET/LOW/HIGH/REMOTE) is used to turn the RT on or off and provides circuit breaker (overload) reset. It can also turn on and off all other components connected to the RT. The POWER switch also establishes the rf output power level (LOW or HIGH) of its transmitter. The REMOTE setting is used when a Remote Box C-2742 is connected to the REMOTE jack on the RT front panel.

The LIGHT switch controls the power to the dial lamp and the CALL lamp. It turns the lamps on and off.

The BAND switch selects the tuning range for manual tuning; BAND A (30.00 to 52.95 MHz) or BAND B (53.00 to 75.95 MHz). The MC control provides manual tuning of the RT in 1 MHz steps (30, 31; 53, 54, etc). The KC control provides manual tuning of the RT in 0.05 MHz steps (.00, .05, .10, etc). A protective shutter covers the MC numbers of the band not used.

When the BAND switch is set at AUTO, band selection and the actual operating frequency is determined by the push button that is pressed in. (Instructions for presetting the ten push buttons to desired operating (channel) frequencies are on the back side of the push button hinged cover.)

The ANT and ANT CONT jacks provide the connections for two cables to connect the RT antenna to the RT. The ANT jack connects the RF Cable (CG-1773/U) to provide the rf signal path. The ANT CONT connects the Control Cable (CX-4722) to the RT. This provides for tuning the antenna elements according to the operating frequency.

The two MIKE jacks provide connection for a variety of audio accessories (e.g., an external loudspeaker, headphones, microphones, handsets, and combination headphone/microphone).

The VOLUME control adjusts the loudness of signals heard from any audio reproducer (e.g., earphone and speaker) connected to the MIKE jacks.

1-7. COMPONENT DESCRITPION – Continued

RECEIVER-TRANSMITTER RT-246/VRC – Continued

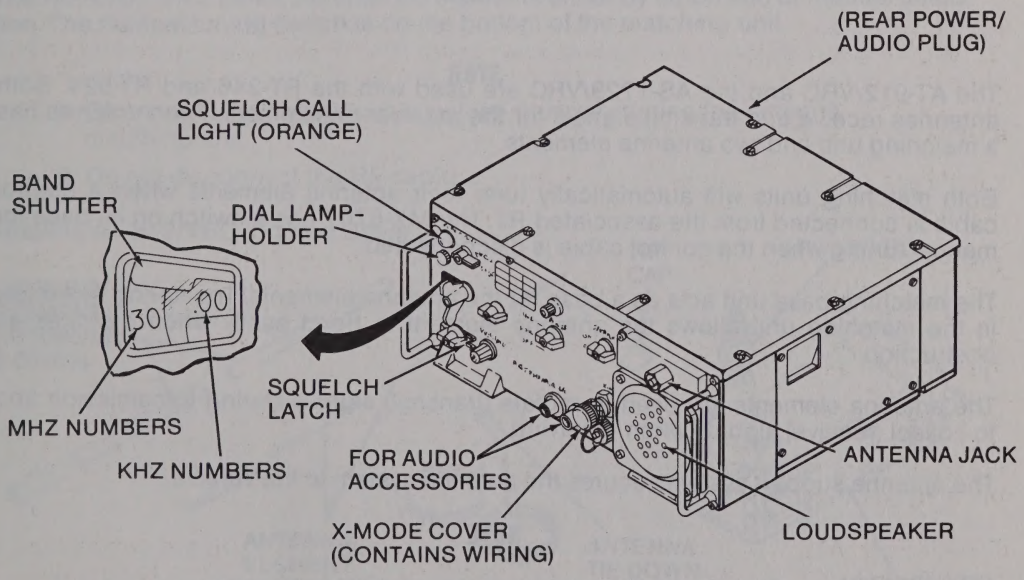
The SQUELCH switch has four positions. If a signal is not received and the SQUELCH is in either of its OFF positions, a random noise (called rushing noise) is produced by the RT receiver. The rushing noise will be passed to the audio reproducers and heard as a hissing sound.

If a signal is not received, and the SQUELCH is in either of its ON positions, the RT squelch circuit will be activated and the audio reproducer will be quieted. For this situation, when a signal is received or the RT is keyed, the RT squelch circuit will automatically be deactivated. The received signal or voice sidetone signal will be heard from the RT audio reproducer. When the squelch deactivates, the RT's CALL lamp will also light (if the RT's LIGHT switch is ON).

The CALL lamp shows that a signal is being received when the SQUELCH control is set to NEW ON or OLD ON.

An X-mode jack is provided for connecting the RT to additional equipment for speech-secure transmission and reception. When secure equipment is not provided, the X-mode plug must be placed on the X-mode jack.

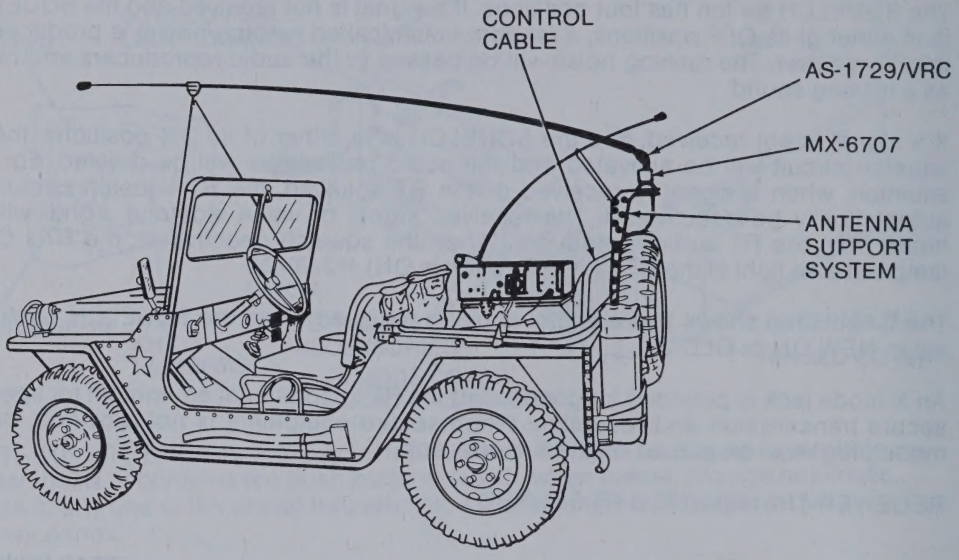
RECEIVER-TRANSMITTER RT-524/VRC



The RT-524/VRC provides the same functions and has the same features as the RT-246, except that there are no provisions for automatic push buttons tuning and remote control from a C-2742. Instead of these features, the RT-524 has a built-in loudspeaker (the RT-246 does not). The front panel SPEAKER switch is used to turn the built-in speaker on and off.

1-7. COMPONENT DESCRIPTION – Continued

RECEIVER-TRANSMITTER ANTENNAS AT-912/VRC, AS-1729/VRC



The AT-912/VRC and the AS-1729/VRC are used with the RT-246 and RT-524. Both antennas receive and transmit signals for the receiver-transmitters. Each antenna has a matching unit and two antenna elements.

Both matching units will automatically tune their antenna elements when a control cable is connected from the associated RT. The MX-6707 has a switch on its base for manual tuning when the control cable is disconnected.

The matching base unit acts as a base for the antenna elements. The spring assembly in the matching unit allows the antenna element to bend easily when it strikes an obstruction.

The antenna elements are used to radiate (transmit) signals during transmission and to collect (receive) signals when receiving.

The antenna support system secures the antenna system to the vehicle.

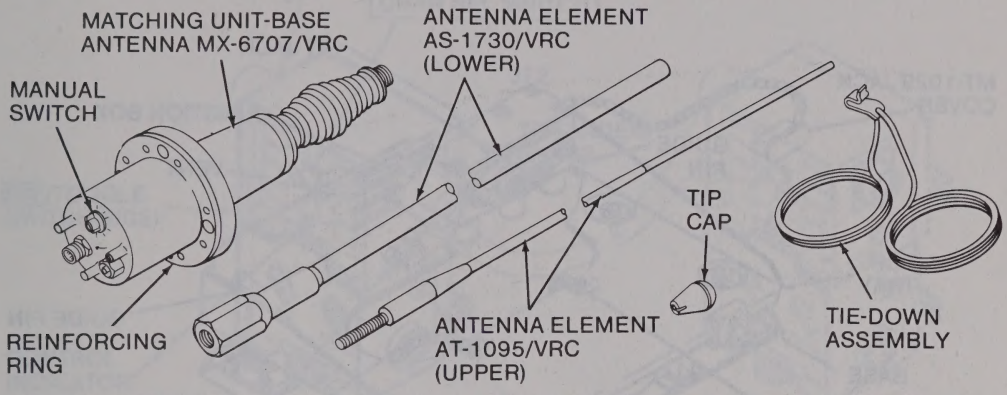
NOTE

The MX-2799 has no provisions for manual tuning.

1-7. COMPONENT DESCRIPTION – Continued

RECEIVER-TRANSMITTER ANTENNAS – Continued

Antenna AS-1729/VRC (Round Base)



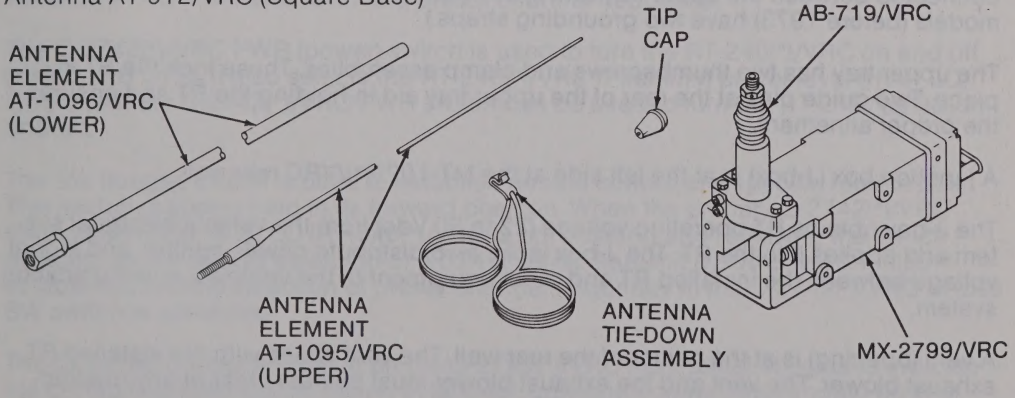
The AS-1729/VRC is used with vehicles which have the Radio Sets AN/VRC-12 and AN/VRC-43 through AN/VRC-49. The Antenna AS-1729 consists of two Whip Antenna Elements (AT-1095/VRC and AS-1730/VRC), a tip cap, the Matching Unit MX-6707/VRC, and miscellaneous hardware.

The MX-6707/VRC tunes the antenna elements either by automatic or manual selection. The manual tuning switch is on the bottom of the matching unit.

NOTE

- Disconnect the control cable before manually tuning the antenna matching unit.
- Do not disconnect the RF cable.

Antenna AT-912/VRC (Square Base)

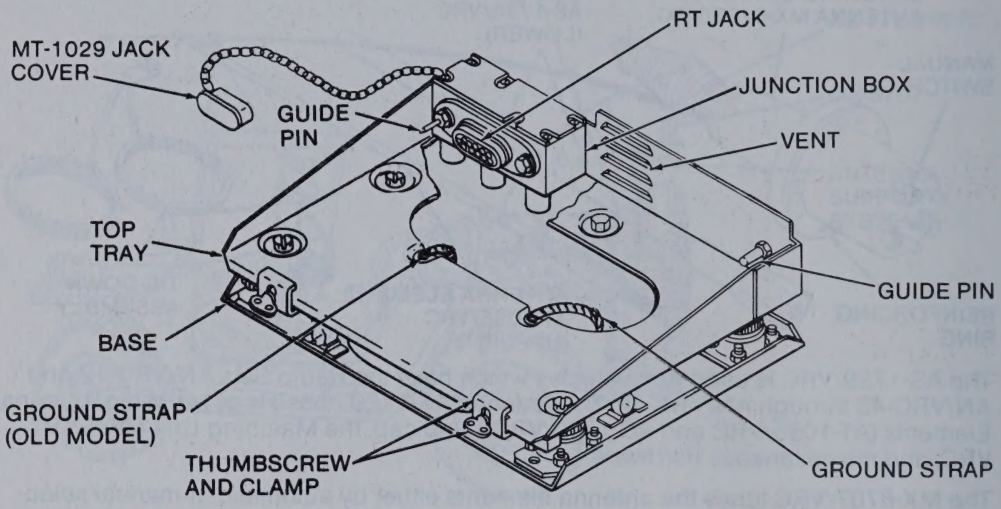


The Antenna AT-912/VRC consists of two Whip Antenna Elements (AT-1095/VRC and AT-1096/VRC), a tip cap, antenna support equipment, antenna tiedown assembly, and Matching Unit MX-2799/VRC.

When RT Control Cable CX-4722 is connected to the matching unit, the MX-2799/VRC automatically tunes the antenna elements to the transmitting frequency of the receiver-transmitter.

1-7. COMPONENT DESCRIPTION – Continued

MOUNTING MT-1029(*)/VRC



The Mounting MT-1029(*)/VRC is used to hold the RT-246(*)/VRC and RT-524(*)/VRC in a vehicle.

The MT-1029/VRC consists of an upper tray and a lower base. A grounding strap is connected between the upper tray and lower base to ensure good grounding. (Earlier models (before 1973) have two grounding straps.)

The upper tray has two thumbscrews and clamp assemblies. These lock the RT in place. Two guide pins at the rear of the upper tray aid in holding the RT and ensures the proper alinement.

A junction box (J-box) is at the left side at the MT-1029(*)/VRC rear wall.

The J-box obtains RT operating voltage (22 to 30 Vdc) from the vehicle electrical system and applies it to the RT. The J-box jacks also distribute power, control, and signal voltage between the installed RT and other equipment of the vehicle's communication system.

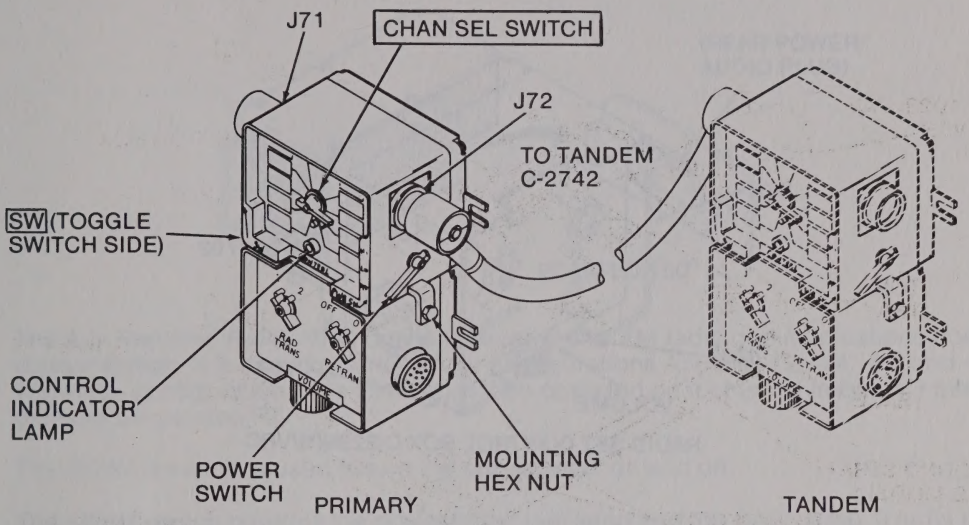
A vent (opening) is at the center of the rear wall. The vent alines with the installed RT exhaust blower. The vent and the exhaust blower must be kept clear of any obstructions to ensure proper cooling of the RT.

NOTE

VINSON speech-secure equipment (TSEC/KY-57) can be connected to the RT when Interconnecting Box J-3513/U is installed between the mount's upper tray and the lower base.

1-7. COMPONENT DESCRIPTION – Continued

FREQUENCY SELECTOR CONTROL BOX C-2742(*)/VRC



The Control Frequency Selector (Remote Box C-2742(*)/VRC is used exclusively with the RT-246(*)/VRC. It permits three remote functions: remote R-246(*)/VRC input power control, remote selection of RT-246(*)/VRC rf transmit power level (low or high), and remote selection of any one of ten preset frequencies.

In some configurations, two C-2742(*)/VRC boxes can connect in tandem. In this case, the C-2742(*)/VRC directly connected to the RT-246/VRC is called the primary C-2742(*)/VRC. The one connected to the primary C-2742(*)/VRC is called the tandem C-2742(*)/VRC. Only one C-2742(*)/VRC at a time can be used to remotely select the RT-246(*)/VRC rf transmit level and preset channel frequency.

The C-2742(*)/VRC PWR (power) switch is used to turn the RT-246(*)/VRC on and off (HI/LO and OFF). It also selects the RT-246(*)/VRC rf transmit power level (HI or LO). Only a primary C-2742(*)/VRC PWR switch can be used to turn the RT-246(*)/VRC on and off.

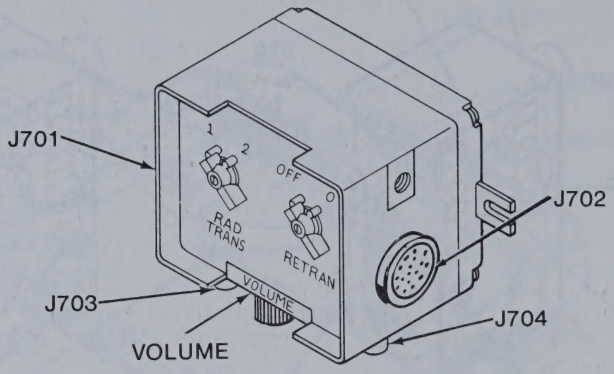
The SW (toggle) switch is used to establish remote control at a specific remote box. This switch is spring-held in its forward position. When the primary C-2742(*)/VRC PWR switch is at HI or LO (RT-246(*)/VRC is on) pushing and releasing the switch establishes the remote selection of RT-246(*)/VRC transmit rf power level. It also establishes remote selection of preset channel frequency at the C-2742(*)/VRC whose SW switch is activiated.

The CONTROL lamp is located on the C-2742(*)/VRC front panel. It lights to indicate the controlling remote box. (When in tandem, only one control lamp should be lit at one time.)

The CHAN SEL (channel selector) is a ten position switch with write-in spaces for each position. Progressing clockwise, the lower left write-in position corresponds with push button number 1, the next write-in position corresponds with push button number 2, the next with number 3, and so forth, to the lower right write-in position, which corresponds with push button number 10.

1-7. COMPONENT DESCRIPTION – Continued

RADIO RELAY CONTROL BOX C-2299(*)/VRC



RADIO SET CONTROL BOX C-2299(*)/VRC

The Radio Relay Control Box C-2299(*)/VRC is used between receiver-transmitters of Radio Sets AN/VRC-45 and AN/VRC-49. In these configurations, the C-2299(*) provides for automatic radio relay (retransmission) operation for distant radio stations that are too far apart to communicate directly with each other. The C-2299(*) has a different function in the six other AN/VRC-12 Radio Sets installed in wheeled vehicles. It can be used to extend an RT's audio accessory function to a more convenient location in the vehicle.

The RETRANS switch (on the front panel) provides relay or independent operation of the two RT's in the AN/VRC-45 or AN/VRC-49 configuration. When at OFF, independent operation of the two RT's is provided by the audio accessories connected to the five-pin audio jacks (on the bottom). When the RETRANS is ON, automatic relay operation is provided, but the independent operation is not.

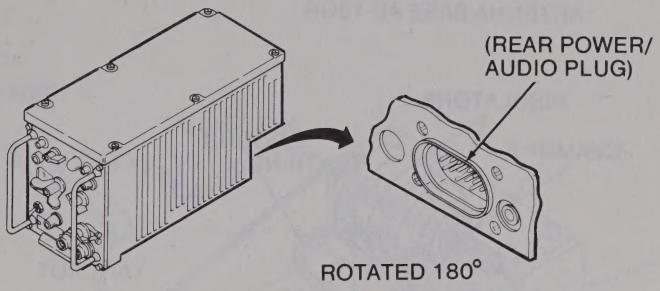
The RAD TRANS switch (on the front panel) provides for selection of the RT to be independently operated (RETRANS at OFF). Position 1 selects the A-RT. Position 2 selects the C-RT.

The VOLUME control (on bottom) provides for adjusting the loudness of audio signals heard from the audio reproducer connected to the C-2299(*).

For AN/VRC-12, -43, -46, -47, and -48 configurations, the C-2299(*) can be used to extend the audio accessory functions of the A-RT. (Audio reproducer function of R-442's cannot be extended to a C-2299(*).) When this is the case, the C-2299(*)'s RETRANS switch remains at OFF and RAD TRANS switch remains at 1.

1-7. COMPONENT DESCRIPTION – Continued

AUX RECEIVER R-442/VRC



The Aux Receiver R-442/VRC provides receive-only FM radio communications from a distant station. It is used as part(s) of the configurations AN/VRC-12, -44, -47, and -48. For these configurations, the R-442(s) will be operated on a channel frequency other than the associated RT.

The POWER switch is used to turn the aux receiver on and off.

The LIGHT switch controls the power to the dial lamp and the CALL lamp. It turns the lamps on and off.

The BAND switch selects the tuning range for manual tuning; BAND A (30.00 to 52.95 MHz) or BAND B (53.00 to 75.95 MHz). The MC control provides manual tuning of the R-442/VRC in 1 MHz steps (30, 31; 53, 54, etc). The KC control provides manual tuning of the R-442/VRC in 0.05 MHz steps (.00, .05, .10, etc). A protective shutter covers the MC numbers of the band not used.

Two AUDIO jacks are used to connect audio reproducer such as headsets and loudspeakers.

The VOLUME control adjusts the loudness of signals heard from any audio reproducer connected to the audio jacks.

Two ANT jacks are provided to connect an rf cable from the auxiliary receiver antenna to the receiver (B-RCVR). When there is a second receiver (C-RCVR), as in AN/VRC-44 or -48, the unused ANT jack on the B-RCVR is connected by rf cable to either ANT jack on the C-RCVR so that both receivers use the same auxiliary receiver antenna.

The SQUELCH switch has four positions. If a signal is not received and the SQUELCH is in either of its OFF positions, a random noise (called rushing noise) is produced by the receiver. The rushing noise will be passed to the audio reproducers and heard as a hissing sound.

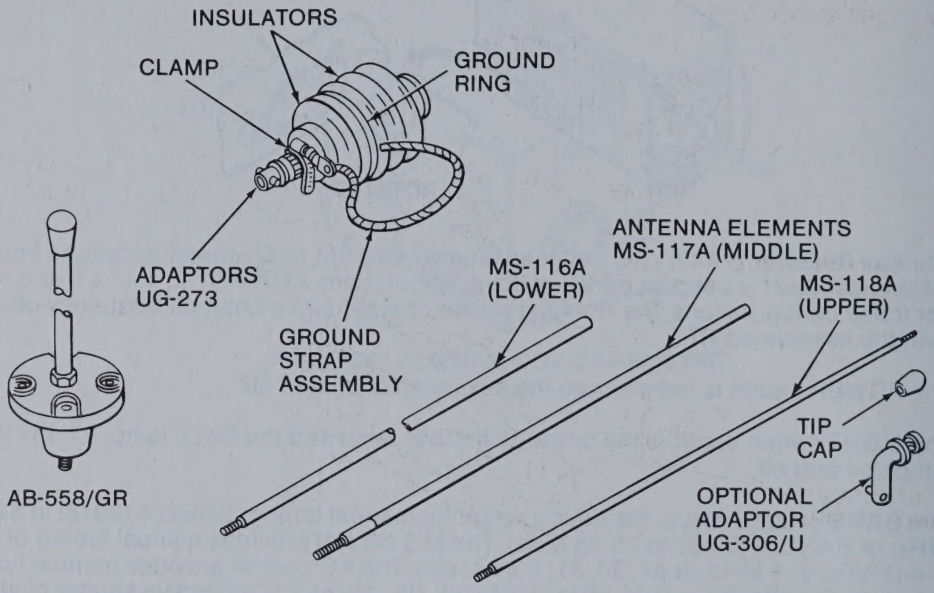
If a signal is not received, and the SQUELCH is in either of its ON positions, the squelch circuit will be activated and the audio reproducer will be quieted. For this situation, when a signal is received or the RT is keyed, the squelch circuit will automatically be deactivated. The received signal or voice sidetone signal will be heard from the audio reproducer. When the squelch deactivates, the CALL lamp will also light (if the LIGHT switch is ON).

The CALL lamp shows that a signal is being received when the SQUELCH control is set to NEW ON or OLD ON.

1-7. COMPONENT DESCRIPTION - Continued

AUX RECEIVER ANTENNA

ANTENNA BASE AB-15GR



The antennas for the Auxiliary Receiver R-442 consist of three Whip Antenna Elements (MS-116A, MS-117A, and MS-118A), a tip cap, the tiedown assembly (not illustrated), an Adaptor (UG-273/U), and a Base (AB-15/GR or AB-558/GR).

The upper section of both bases has a shaft with a spring section. The spring section allows the antenna elements to bend easily when the antenna strikes an obstruction. Both bases have a ground strap assembly which consists of a ground wire and a ground clamp. After the antenna is mounted, the ground clamp completes the ground when connected to the Adapter UG-273/U.

The antenna elements are used to collect (receive) signals.

The Adapter UG-273/U is needed to connect the aux receiver rf cable to the antenna base jack.

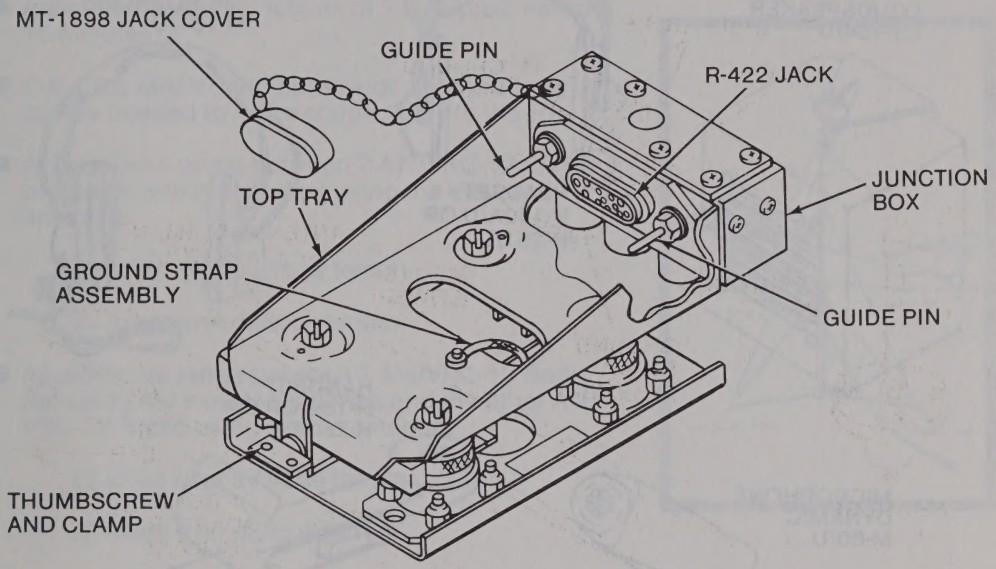
The Adapter UG-306/U is an optional adapter used in some installations. This optional adapter is used when a right-angle connection is required to prevent damage to rf cable.

NOTE

The Antenna Element AT-1095/VRC may be substituted for the normally used three elements (MS-116A, MS-117A, and MS-118A).

1-7. COMPONENT DESCRIPTION – Continued

MOUNTING MT-1898(*)/VRC



The Mounting MT-1898(*)/VRC is used to hold the Aux Receiver R-442/VRC in a vehicle.

The MT-1898(*)/VRC consists of an upper tray and a lower base. A grounding strap is connected between the upper tray and lower base to ensure good grounding.

The upper tray has one thumbscrew and clamp assembly. It locks the R-442/VRC. Two guide pins at the rear of the upper tray aid in holding the R-442/VRC and ensure the proper alinement.

A junction box (J-box) is at the center of the MT-1898(*)/VRC rear wall.

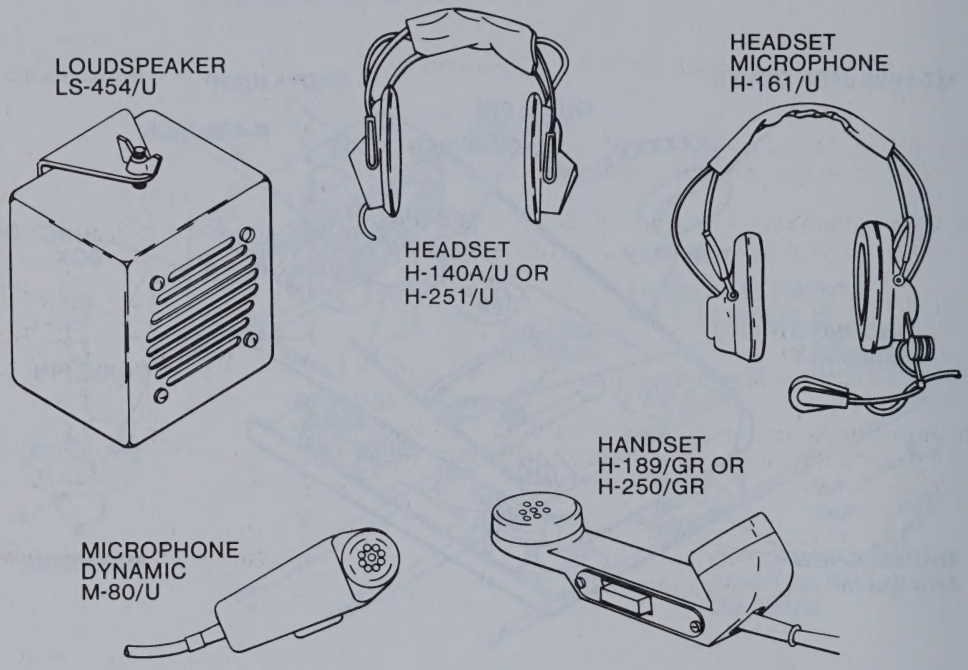
The J-box obtains operating voltage (22 to 30 Vdc) from the A-RT mount through its power input jack. The J-box jacks also distribute power and signal voltages between the installed R-442/VRC and other equipment of the vehicle's communication system.

NOTE

VINSON speech-secure equipment (TSEC/KY-57) can be connected to the receiver when Interconnecting Box J-3514/U is installed between the mount's upper tray and lower base.

1-7. COMPONENT DESCRIPTION – Continued

AUDIO ACCESSORIES



Typical audio accessories include a loudspeaker, microphone, headset, and a handset. They allow the use of the vehicular communication system.

The dynamic microphone (M-80/U) is provided with a push-to-talk/release-to-listen (key) switch.

Typical Handsets are the H-189/GR and the H-250/U. They are provided with a microphone, an earphone, and a push-to-talk/release-to-listen (key) switch.

The Headsets H-140/U and H-251/U and the Loudspeaker LS-454/U are audio reproducers only.

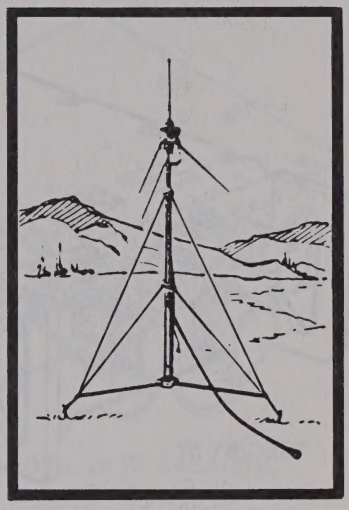
The Headset H-161/U consists of a microphone, earphone, and a key switch. The key switch has three positions. The center position, OFF, has a release-to-listen action. The RAD position has a spring-loaded, push-to-talk action. INT is not used in wheeled vehicles.

All the audio accessories may be connected to the C-2299/VRC or the audio jacks on the radio components.

AUDIO ACCESSORY CONNECTIONS. See paragraphs 2-2, 2-3, and 2-5.

1-7. COMPONENT DESCRIPTION – Continued

ELEVATED ANTENNA



- Antenna erection for a team of 2 is approximately 15 minutes.
- C-E ORG MAINT should provide the extra long cables needed to make connections to the RT.
- Approximate range between 2 AN/VRC-12 Series of Radios with both radios using the elevated antenna:

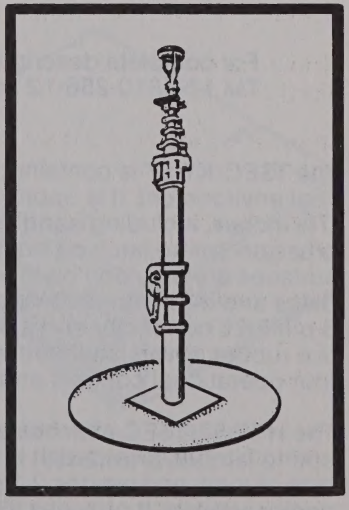
  36 miles over average terrain.

  30 miles over difficult terrain.
- Approximate range between 1 AN/VRC-12 Radio Set using the elevated antenna and the other AN/VRC-12 Radio using a whip antenna:

  25 miles over average terrain.

  20 miles over difficult terrain.

TELESCOPING ANTENNA MAST (AB-903/G)

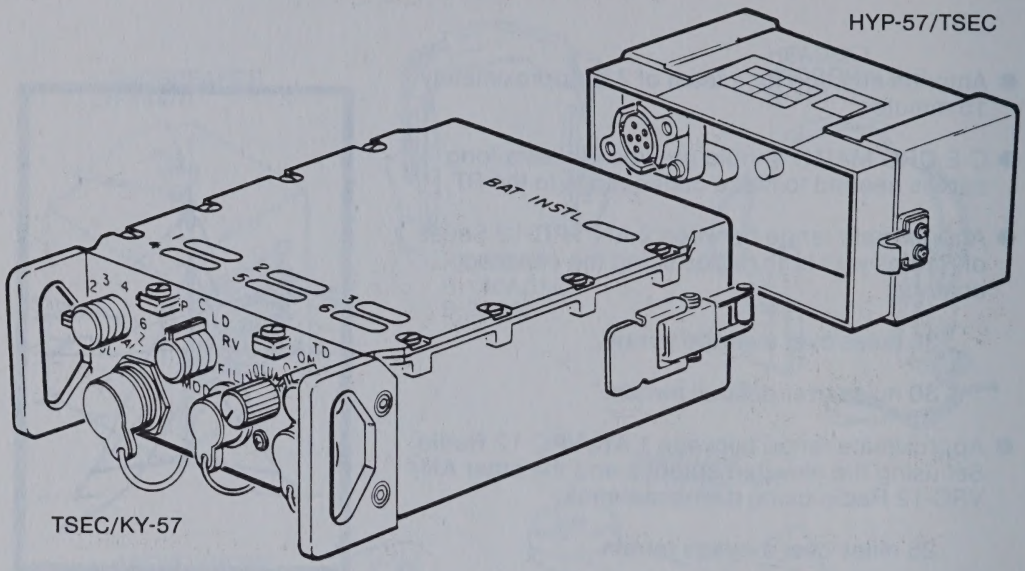


- Either the compact Antenna Matching Unit (MX-9146/GRC) or the round base Antenna Matching Unit (MX-6707) is placed atop the telescoping antenna mast.
- The Telescoping Antenna Mast AB-903/G can be hand-cranked from 6 feet to approximately 30 feet.

  Time required to handcrank is approximately 25 seconds.
- The Telescoping Antenna Mast AB-903/G can be attached to the side of a vehicle or mounted on the ground. (To mount antenna mast on vehicle, notify CE-ORG MAINT.)

1-7. COMPONENT DESCRIPTION – Continued

VINSON COMSEC EQUIPMENT (TSEC/KY-57 AND HYP-57/TSEC)



The TSEC/KY-57 (VINSON) is a small, lightweight, wideband secure voice digital communications equipment designed for use with very high frequency (VHF) frequency modulated (FM) radio sets. It is push-to-talk equipment operating at 16,000 bits per second.

NOTE

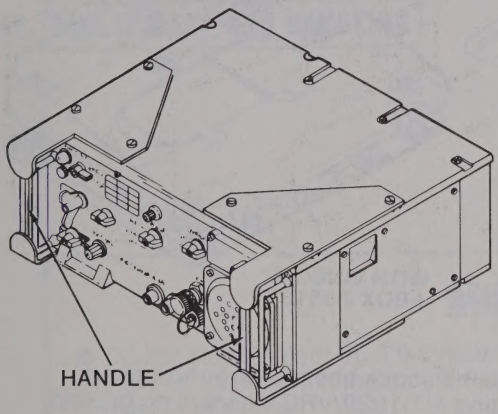
For complete description of VINSON COMSEC equipment, refer to TM 11-5810-256-12 and TM 11-5810-312-12-2.

The TSEC/KY-57 is contained in a die cast aluminum housing for use in a rugged tactical environment. It is approximately 3 inches high, 5¾ inches wide, 6¾ inches long (7⅞ inches, including handles) and weighs 5 pounds (without battery). It has a compression spring latch on both sides for attaching a vehicular power adapter. Writing surfaces are provided on the top of the chassis for recording fill battery installation dates and other operational data. The front panel has a 19-pin RADIO connector, a 6-pin FILL connector and a 6-pin AUDIO connector. These connectors have protective rubber covers attached to the chassis with nylon cords. Also on the front panel are four operational controls and luminescent panel markings.

The HYP-57/TSEC attaches at the back of the TSEC/KY-57 using the compression spring latches provided. It is approximately 2¾ inches high, 4¾ inches wide, 2¾ inches long, and weighs 2.1 pounds. The HYP-57/TSEC functions as an interface connector adapter. It provides filtered power to the TSEC/KY-57 when operating with a standard vehicle power source.

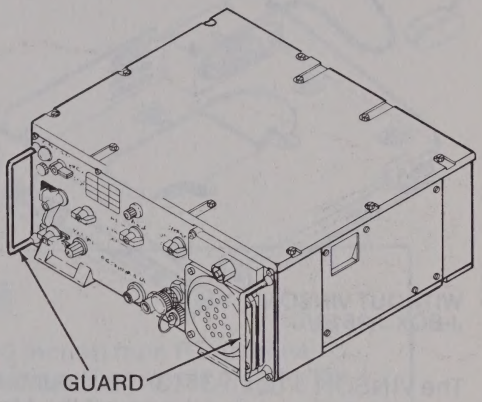
1-8. DIFFERENCES BETWEEN MODELS

RECEIVER-TRANSMITTERS: RT-524/VRC AND RT-524A/VRC
RT-246/VRC AND RT-246A/VRC



RT-524/VRC or RT-246/VRC

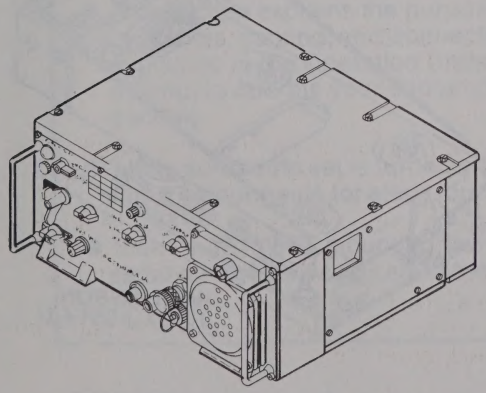
Has handles over small guards.



RT-524A/VRC or RT-246A/VRC

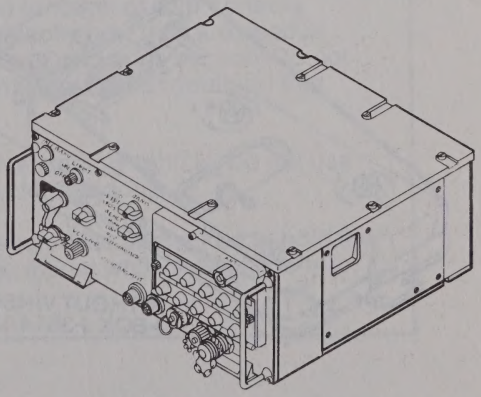
Has larger, stronger guards which can be used as handles.

RECEIVER-TRANSMITTERS RT-524(*)/VRC and RT-246(*)/VRC



RT-524(*)/VRC

Has a built-in loudspeaker and a speaker switch.

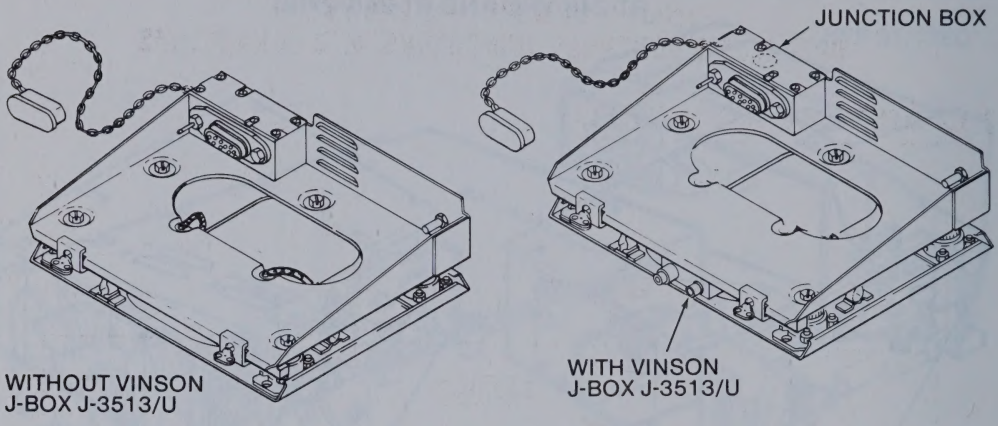


RT-246(*)/VRC

Has push button remote and tuning control capability and doesn't have a built-in loudspeaker.

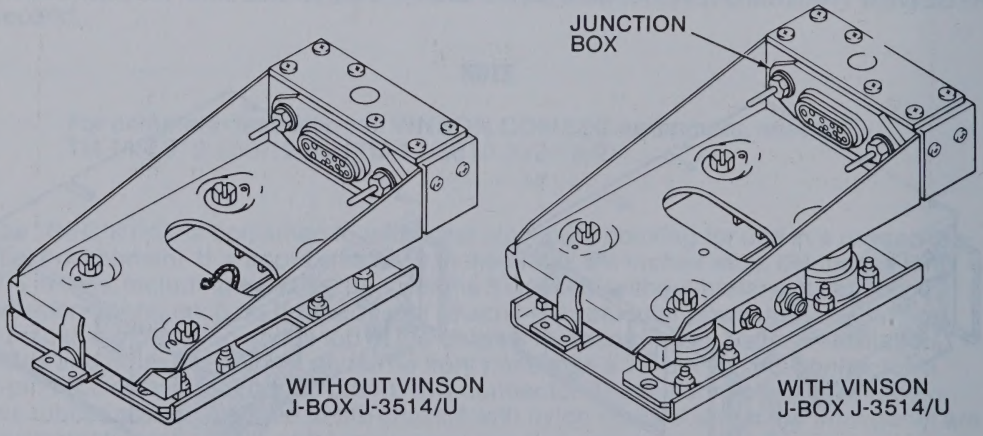
1-8. DIFFERENCES BETWEEN MODELS – Continued

MOUNT MT-1029(*)/VRC: WITH AND WITHOUT VINSON J-BOX J-3513/U (NO FUSE)



The VINSON J-box J-3513/U is mounted on the shock absorbers, sandwiched between the base and the tray of the Mounting MT-1029/VRC. There is no ground strap used with the VINSON J-box.

MOUNT MT-1898/VRC: WITH AND WITHOUT VINSON J-BOX J-3514/U



The VINSON J-box J-3514/U is mounted on the shock absorbers, sandwiched between the base and the tray of the mounting MT-1898/VRC. There is no ground strap used with the VINSON J-box.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS, INDICATORS, AND CONNECTORS

2-1. SAFETY, CARE AND HANDLING

WARNING

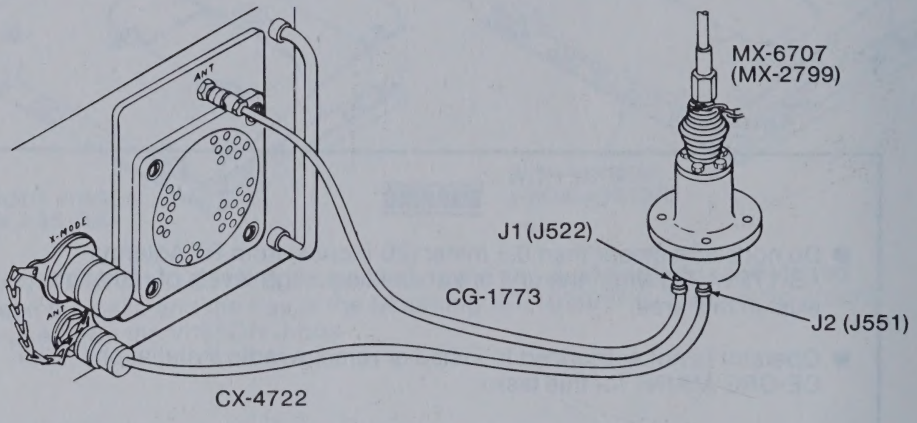
- Do not stand closer than 0.5 meter (20 inches) from RT Antenna AS-1729/VRC when the unit is transmitting. High levels of radiation exist in this area.
- Operator is not authorized to install or remove radio installations. Call CE-ORG MAINT for this task.

CAUTION

- This section explains the purpose and function of your controls, indicators, cabling, and connectors. Exactly how they are used is explained in the Operation Under Usual Conditions section. Do not attempt to operate your equipment until you fully understand this section.
- Make sure radio set is turned off before starting vehicle. Do not use radio components for steps, or cables for handrails.
- Make sure the RT mounting clamp assemblies are locked to hold the radio component securely in the radio mount while the vehicle is in motion.

2-2. RECEIVER-TRANSMITTER RT-246(*)/VRC AND RT-524(*)/VRC

CHECK RT ANTENNA CABLE CONNECTIONS



Control Cable CX-4722 is connected between RT's ANT CONT jack and large jack on base of antenna matching unit.

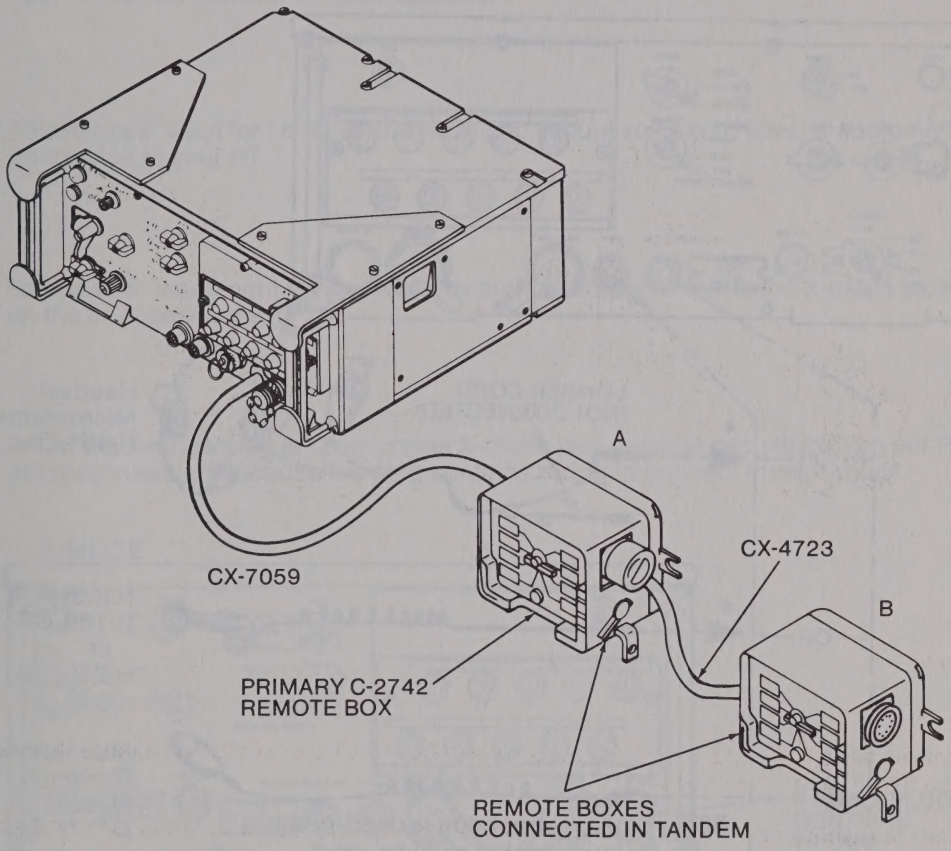
Antenna Cable CG-1773 is connected between RT's ANT jack and small jack on base of antenna matching unit.

NOTE

- Cabling applies to A-RT of all AN/VRC-12 configurations. It also applies to C-RT of AN/VRC-45 and -49 configurations.
- Whenever you change the RT frequency, the proper circuits in the antenna matching unit are automatically selected.

2-2. RECEIVER-TRANSMITTER RT-246(*)/VRC AND RT-524(*)/VRC – Continued

CHECK REMOTE BOX (C-2742(*)/VRC) CABLE CONNECTIONS



Remote Cable CX-7059 is connected between RT's REMOTE jack and left side jack of primary C-2742.

Tandem Cable CX-4723 is connected between right side jack of primary C-2742 and left side jack of tandem C-2742.

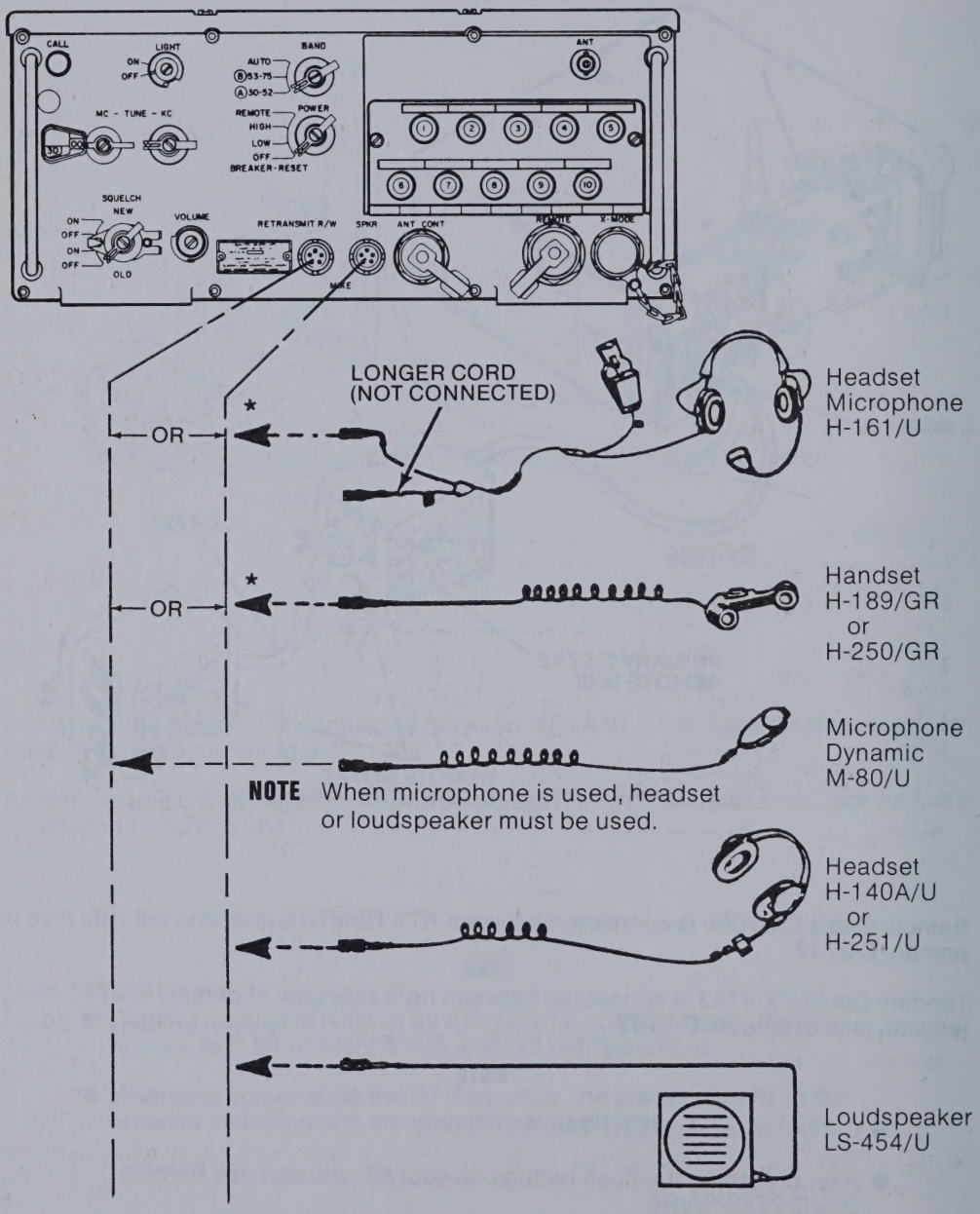
NOTE

- C-2742 is used with RT-246(*)/VRC only.
- After presetting the push buttons on your RT, you can use Remote Box C-2742(*)/VRC.

2-2. RECEIVER-TRANSMITTER RT-246(*)/VRC AND RT-524(*)/VRC – Continued

CHECK AUDIO ACCESSORIES CONNECTION TO RT

The number and type of audio accessories you will use is determined by your mission.



*May be connected to either the RETRANSMIT R/W or SPKR jack on the RT.

2-2. RECEIVER-TRANSMITTER RT-246(*)/VRC AND RT-524(*)/VRC – Continued

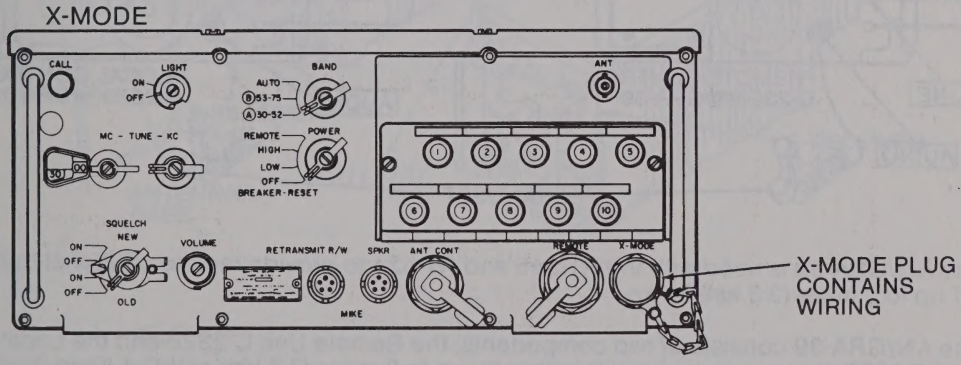
CHECK CONNECTION OF RT's X-MODE PLUG

- Your RT can be used for X-mode operation.

- This mode is used for sending and receiving secure voice with special equipment connected to your RT.

- This special equipment is connected by authorized personnel to the X-mode jack on the front panel of your RT.

- When the X-mode plug is taken off the X-mode jack, special circuits inside your RT are disconnected because the plug contains wiring to connect these circuits.



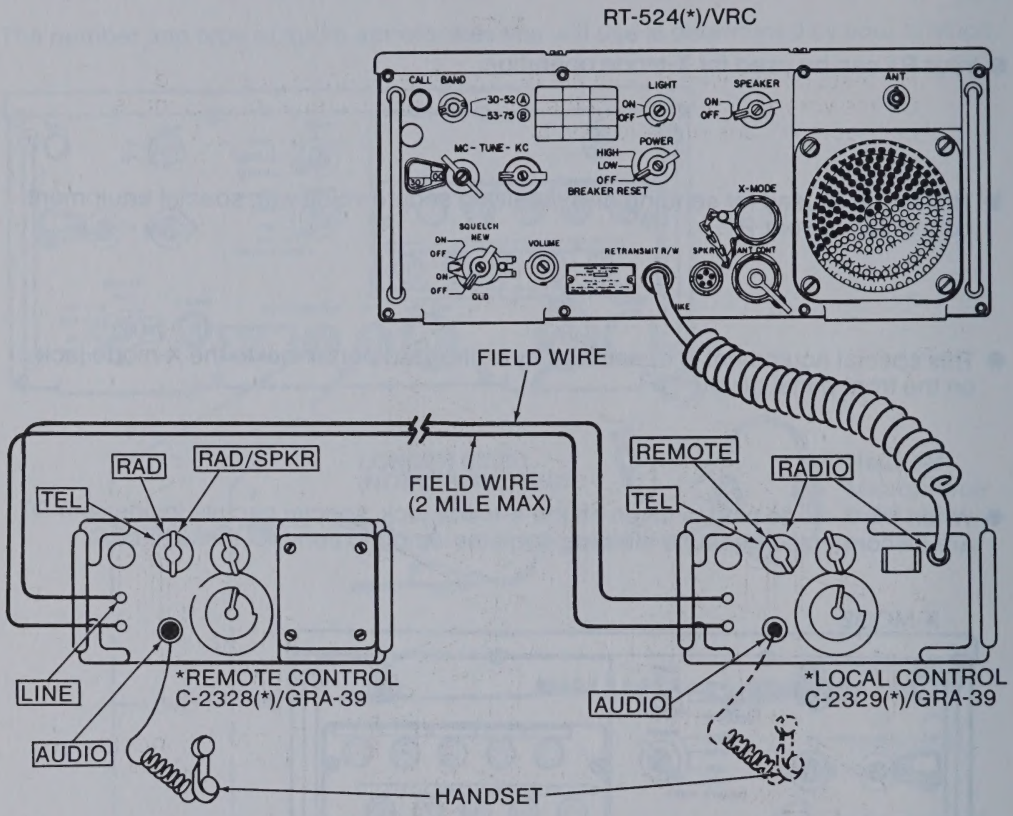
and

- When the cable for the X-mode equipment is connected to your X-mode jack, these circuits are reconnected in a special way.

- Remember, if no cable is connected to your front panel X-mode jack, make sure the X-mode plug is snugly screwed on the X-mode jack.

2-2. RECEIVER-TRANSMITTER RT-246(*)/VRC AND RT-524(*)/VRC – Continued

CHECK CONNECTION OF RT TO AN/GRA-39 REMOTE CONTROL GROUP



The AN/GRA-39 is used with the RT-246 and RT-524 to provide remote control of the RT up to 2 miles (3.3 km) away.

The AN/GRA-39 consists of two components; the Remote Unit C-2328 and the Local Unit C-2329, that are connected together by up to 2 miles (3.3 km) of WD-1 Field Wire. The local unit's control cable is connected to the radio set's RT unit.

The AN/GRA-39 components provide a telephone link between the remote operator and the radio operator when the C-2328 and C-2329 mode selectors are in TEL.

When the AN/GRA-39 components are to provide remote control of the radio set, the C-2328 mode selector must be in RAD or RAD/SPKR while the C-2329 mode selector is in REMOTE.

NOTE

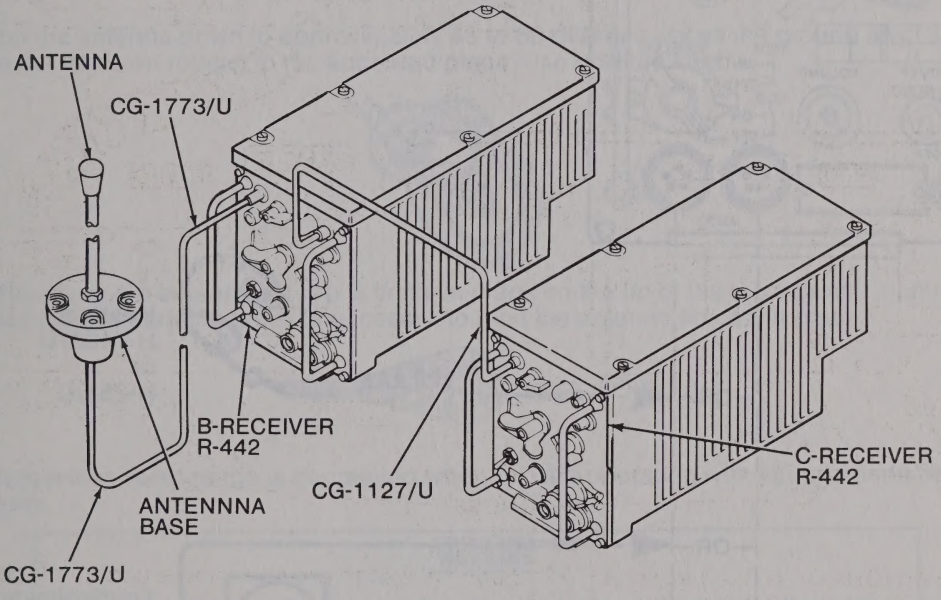
AN/GRA-39 is used only when mission requires this type of hookup.

2-3. AUXILIARY RECEIVER R-442(*)/VRC

CHECK AUXILIARY RECEIVER ANTENNA CABLE CONNECTIONS

NOTE

For installations where there are two auxiliary receivers, the B- and C-receivers are coupled together and the auxiliary receiver antenna is connected to one of the receivers.

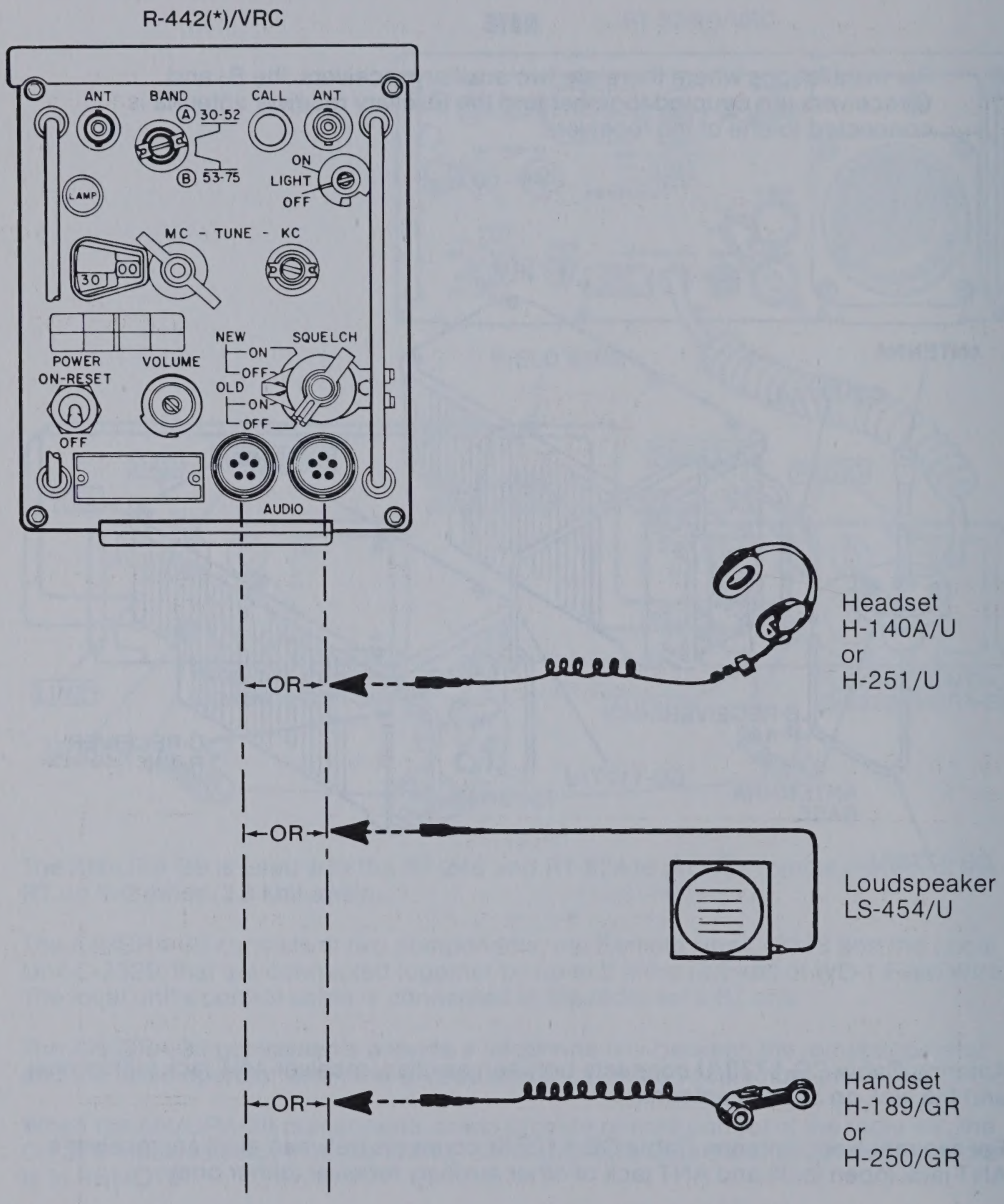


Antenna Cable CG-1773/U connects between auxiliary receiver ANT jack (either one) and the jack on base of antenna.

For two receivers, Antenna Cable CG-1127/U connects between auxiliary receiver's ANT jack (open jack) and ANT jack of other auxiliary receiver (either one).

2-3. AUXILIARY RECEIVER R-442(*)/VRC – Continued

CHECK AUDIO ACCESSORIES CONNECTION TO R-422(*)/VRC



NOTE

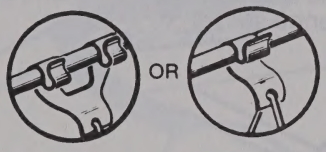
There are two identical AUDIO jacks, either may be used.

2-4. WHIP ANTENNA TIE-DOWN AND TIP CAP INSTALLATION PROCEDURES

NOTE

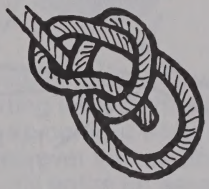
These procedures apply to all whip antennas with 2 or 3 antenna elements.

Slide the V-shaped clamp of the tie-down assembly to the middle of the top antenna element.



PROPER TIE-DOWN CLAMP

Pull the antenna down to approximately 45 to 60 degrees above the ground level and tie the tie-down rope(s) to the approved place. Use bowline knot.



Make sure the antenna tip cap is firmly in place on the tip of the top antenna element. Use low temperature tape, if necessary, to tape the antenna tip cap in place.

Remember, radio range is decreased when you are operating with your antenna tied down.

WARNING

With the antenna tied down in the secure position, damage to the whip can occur if the whip contacts any fixed object such as overhead bridges, etc. The possibility of serious or fatal injury exists to outside personnel from flying antenna parts.

Double check your antennas after tie down to make sure they do not stick out beyond the sides of the vehicle and that no person walking by the vehicle can be hit in the face by the tied-down antenna tip.

CAUTION

When two or more antennas are being tied down, make sure the antennas do not cross each other.

NOTE

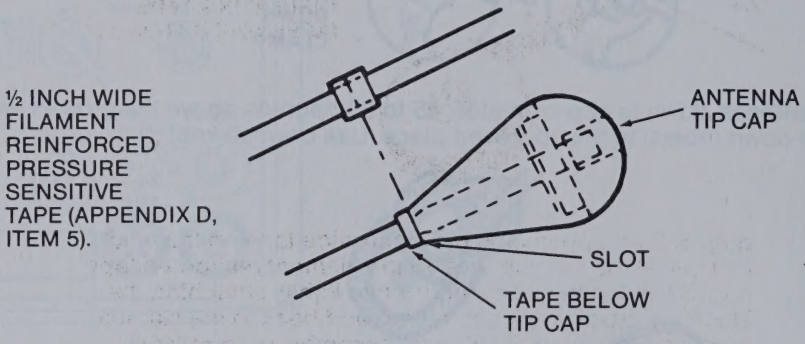
When vehicles are parked in motor pool, release the antenna to remove undo strain from the spring section of antenna base. (Check to see if there are any overhead power lines present when performing this task.)

2-4. WHIP ANTENNA TIE-DOWN AND TIP CAP INSTALLATION PROCEDURES – Continued

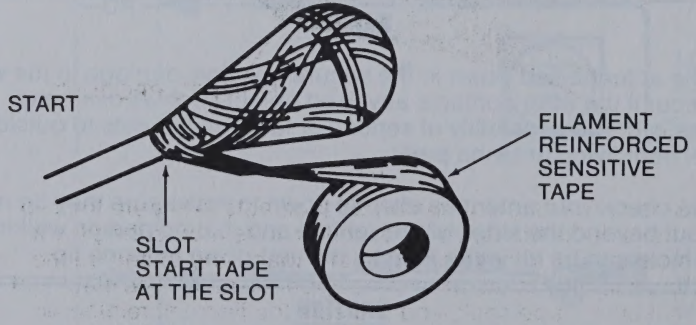
NOTE

These procedures apply to all whip antennas with 2 or 3 antenna elements.

When the antenna tip cap does not fit the antenna upper element, use the following procedures to attach the cap to the antenna section.

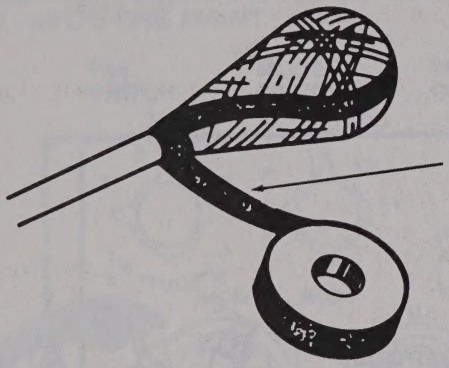


Step 1. Apply 6-7 layers of ½ inch wide filament-reinforced pressure sensitive tape approximately 2 inches from the end of antennas top section. Push antenna tip cap on upper element as far as possible so that the slotted skirt of the antenna tip assembly rests in contact with the tape.

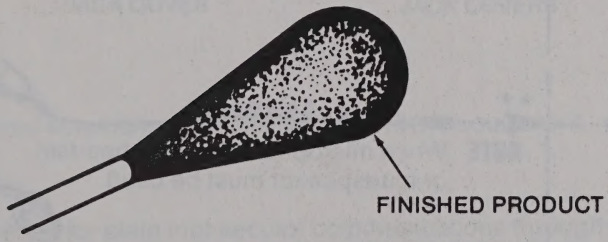


Step 2. Start tape at the slot. Wrap across skirt slot to conform with the shape of the tip cap base so that the tape goes over the cap top and returns to the slotted end. Cut tape and make new start at next slot, repeating the procedure in a crossing pattern until all slots have been reinforced and the antenna tip cap is completely covered.

2-4. WHIP ANTENNA TIE-DOWN AND TIP CAP INSTALLATION PROCEDURES – Continued



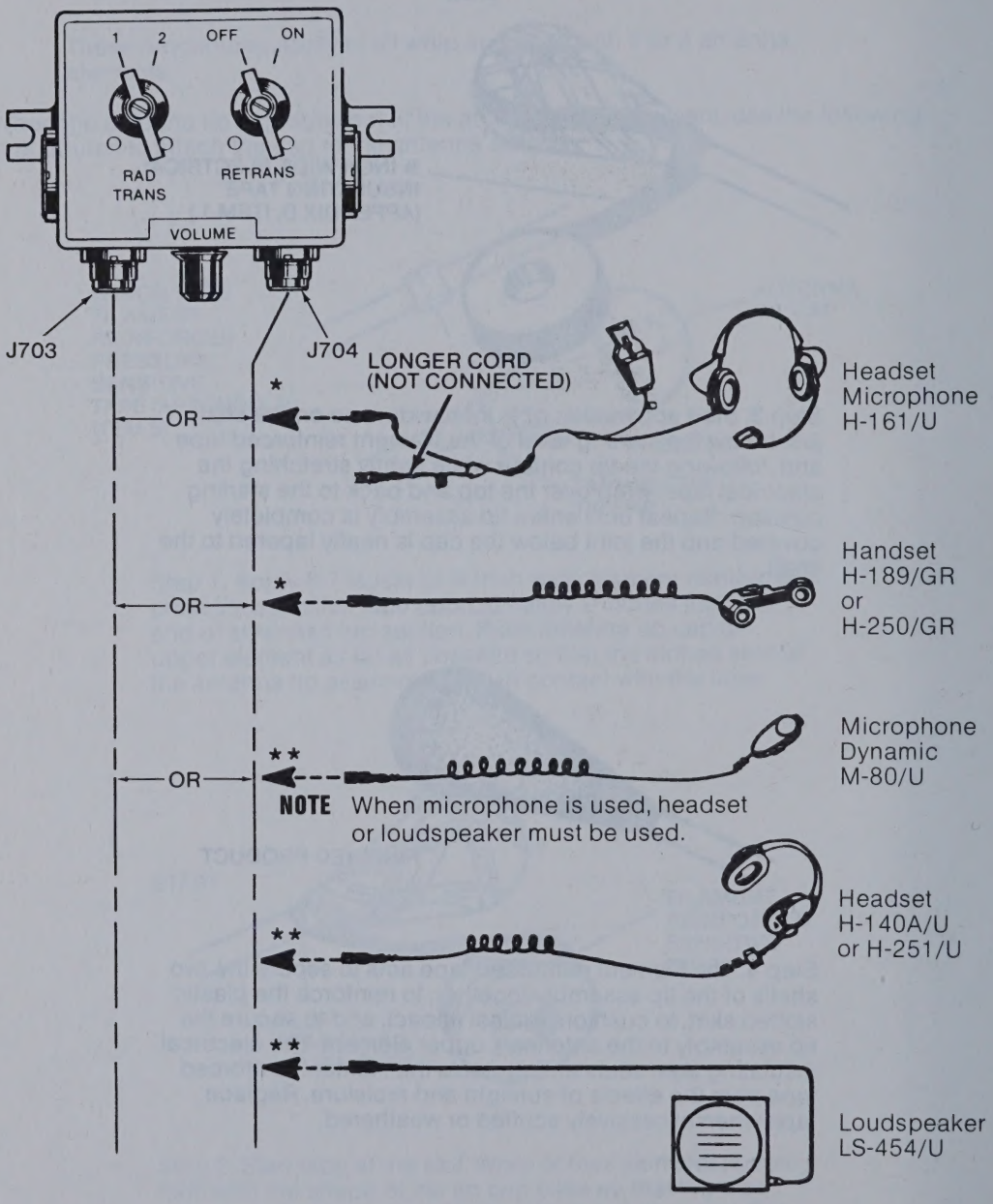
Step 3. Start application of ¾ inch wide tape on the shaft just below the starting level of the filament reinforced tape and, following the tip contour while lightly stretching the electrical tape, wrap over the top and back to the starting position. Repeat until entire tip assembly is completely covered and the joint below the cap is neatly tapered to the shaft.



Step 4. The filament reinforced tape acts to secure the two shells of the tip assembly together, to reinforce the plastic slotted skirt, to cushion against impact, and to secure the tip assembly to the antenna's upper element. The electrical insulating tape seals and protects the filament reinforced tape from the effects of sunlight and moisture. Replace tape when excessively scuffed or weathered.

2-5. CHECK AUDIO ACCESSORIES CONNECTION TO C-2299/VRC

In a number of radio sets, you will find the Relay Box C-2299/VRC being used as an audio convenience box. This provides additional ways for connecting the audio accessories.

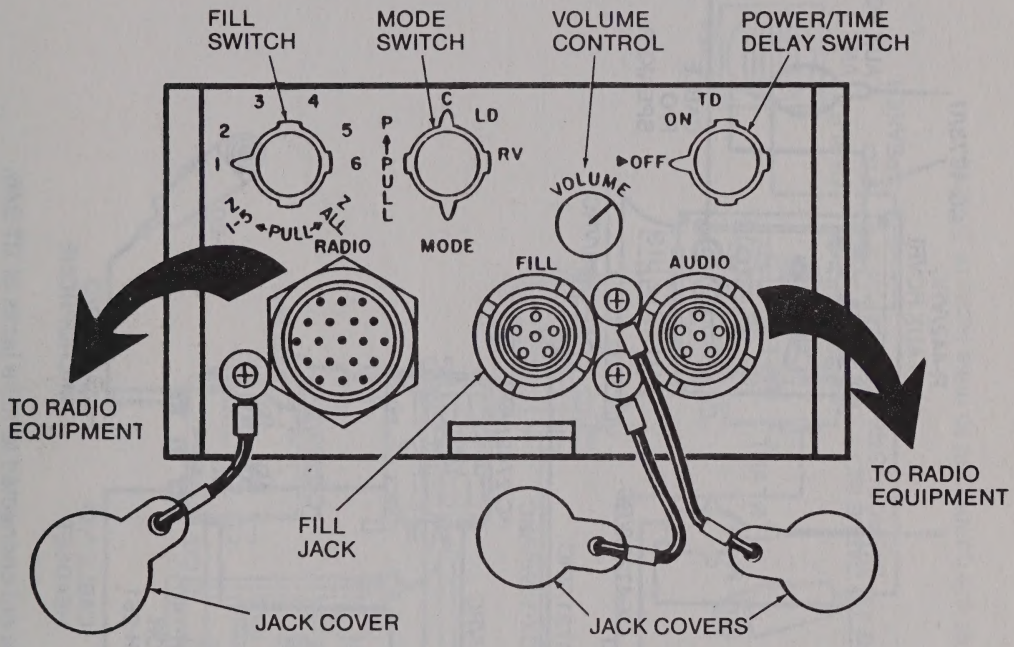


*May be connected to either jack J703 or J704 on the Relay Box (C-2299/VRC).
**M-80 can be connected to either jack. Headset or speaker will be connected to the other jack.

2-6. OPERATOR'S CONTROLS AND CONNECTORS ON VINSON COMSEC EQUIPMENT (TSEC/KY-57)

NOTE

Check that your radio and TSEC/KY-57 have been installed properly; if not, call C-E ORG MAINT.



FILL SWITCH

Selects the desired scrambling circuits in the VINSON equipment.

MODE SWITCH

Has four positions; P for plain (not secure) communications through the radio equipment, C for CIPHER (secure) communications through the radio equipment, LD used when loading the VINSON scrambler circuits, and RV used for special secure operations.

NOTE

You can receive (not secure) signals in the C position.

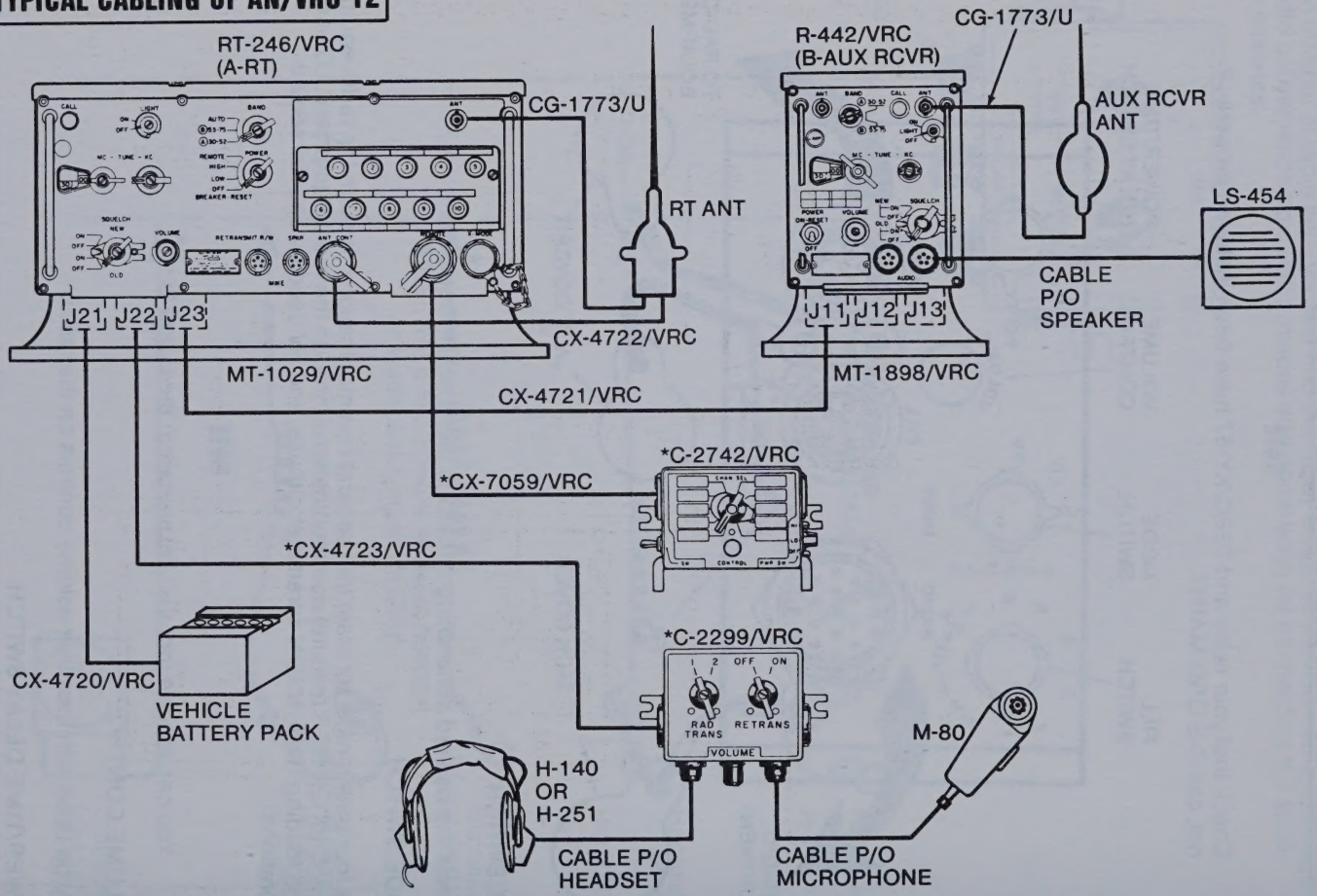
VOLUME CONTROL

May be used with the other volume controls on the radio.

POWER/TIME DELAY SWITCH

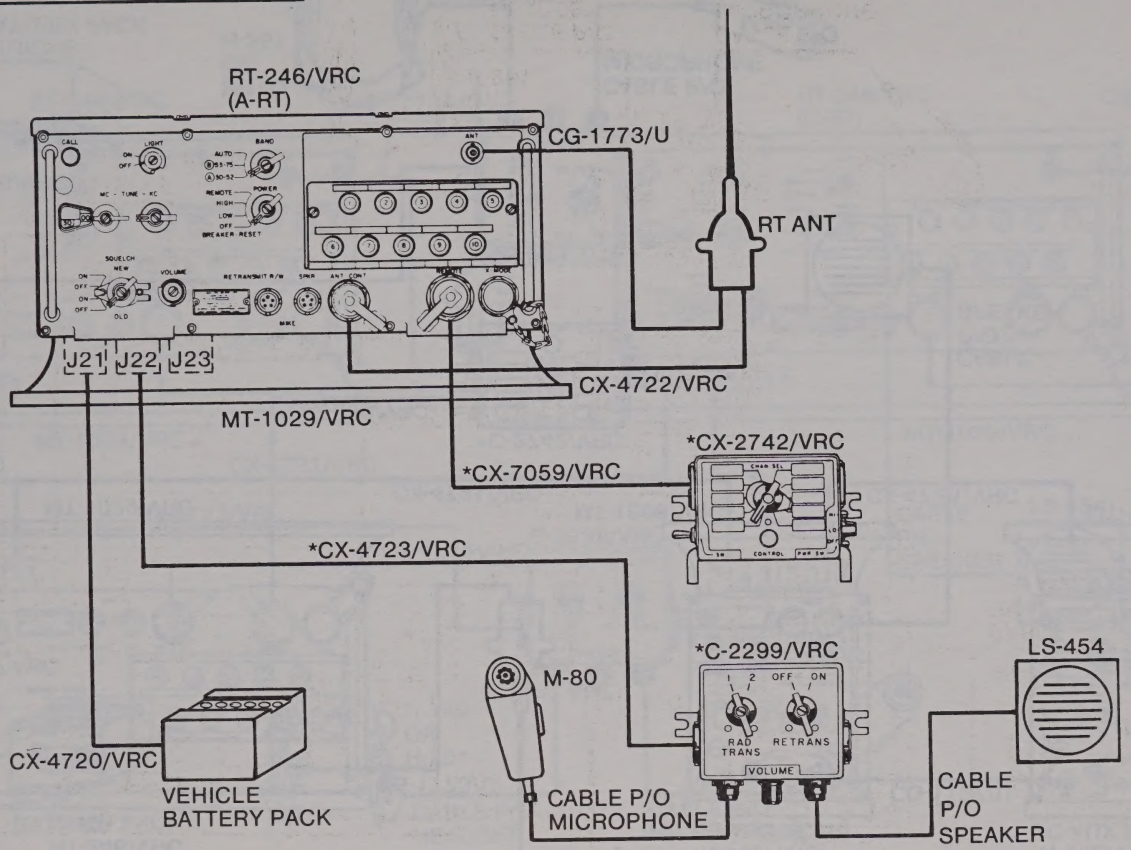
Has three positions; ON applies power to VINSON equipment, OFF removes power, and TD provides time delay operation.

2-7. TYPICAL CABLING OF AN/VRC-12



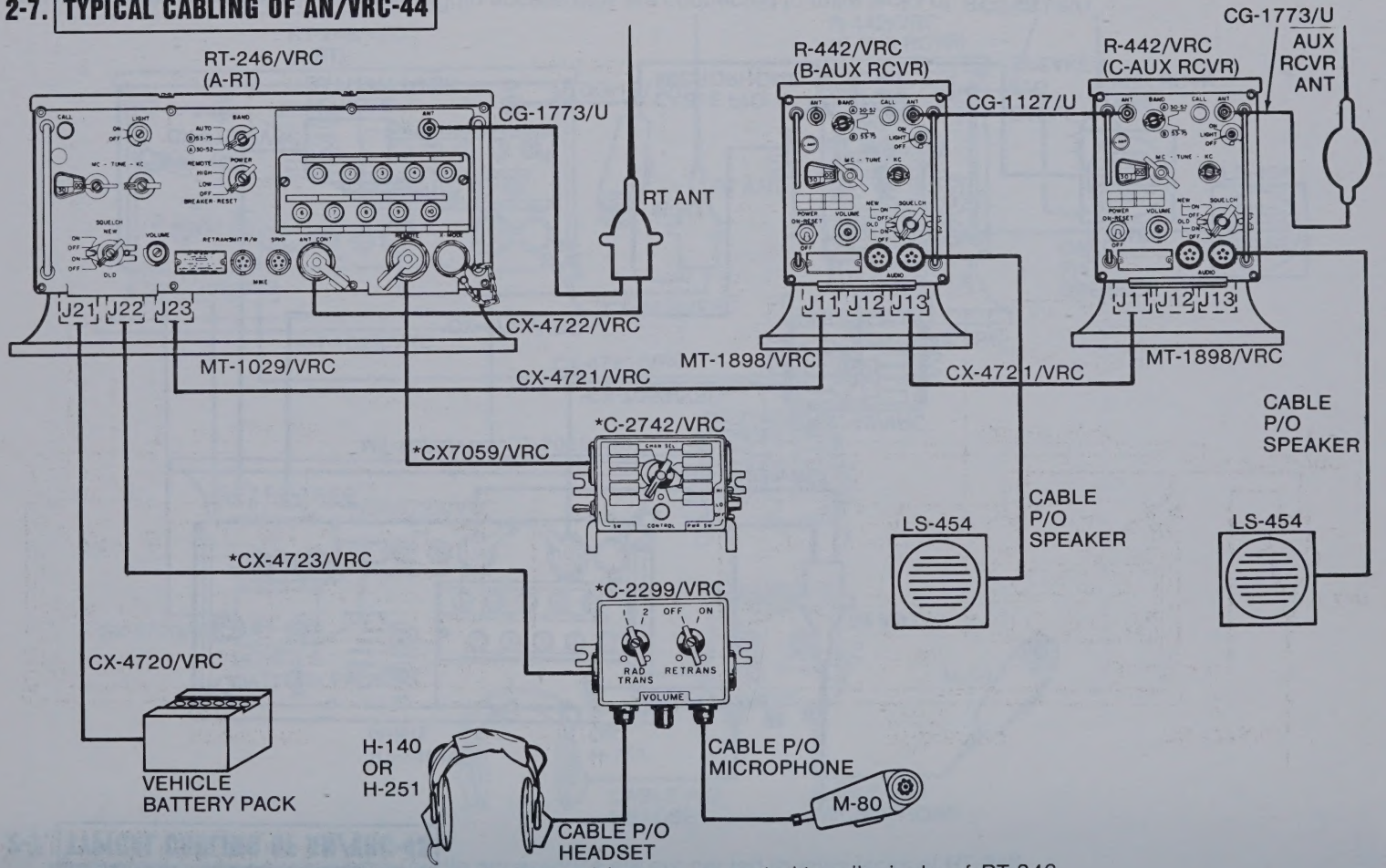
*OPTIONAL – When not available, audio accessories are connected to mike jacks of RT-246.

2-7. TYPICAL CABLING OF AN/VRC-43



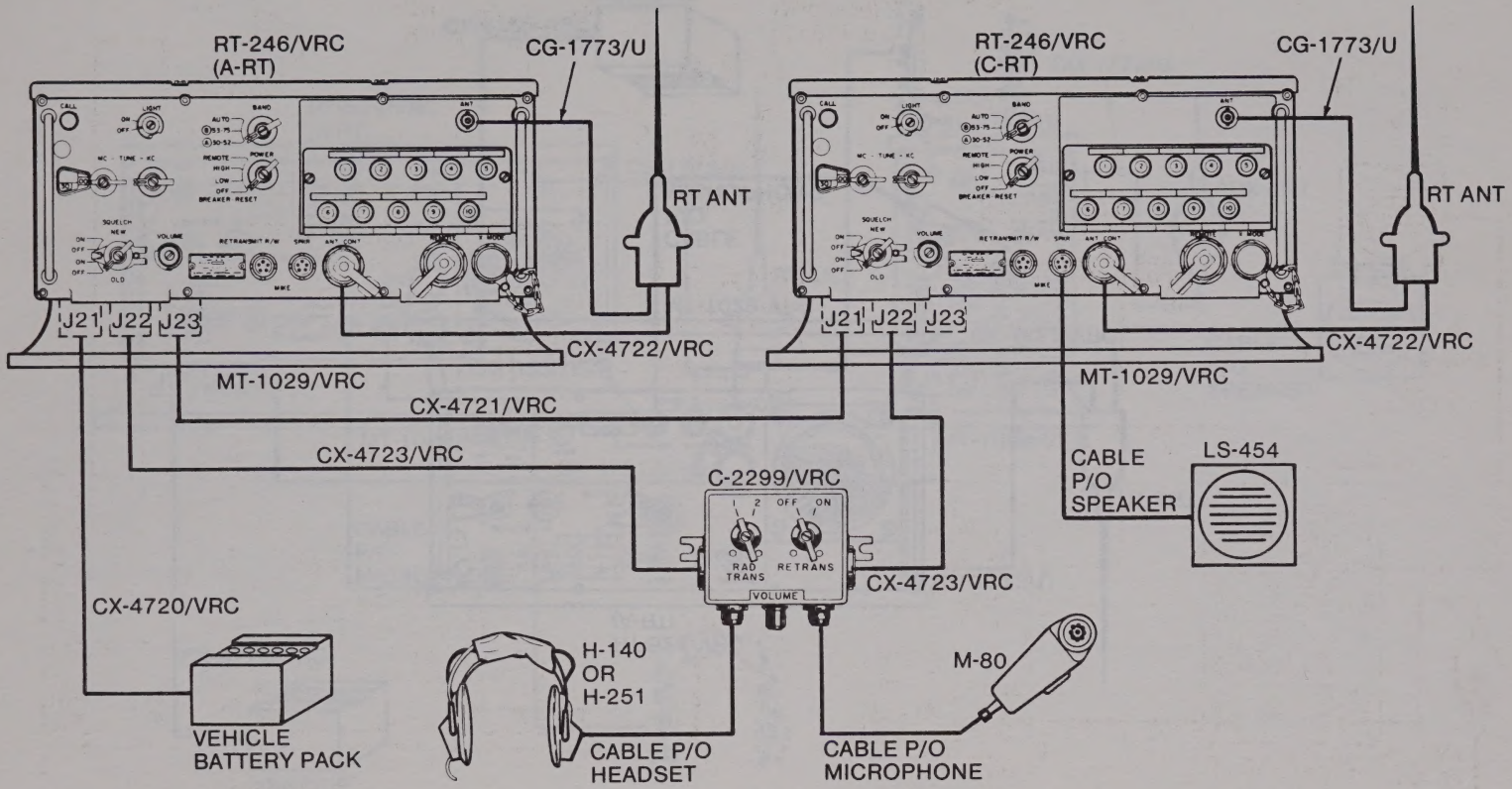
*OPTIONAL – When not available, audio accessories are connected to mike jacks of RT-246.

2-7. TYPICAL CABLING OF AN/VRC-44

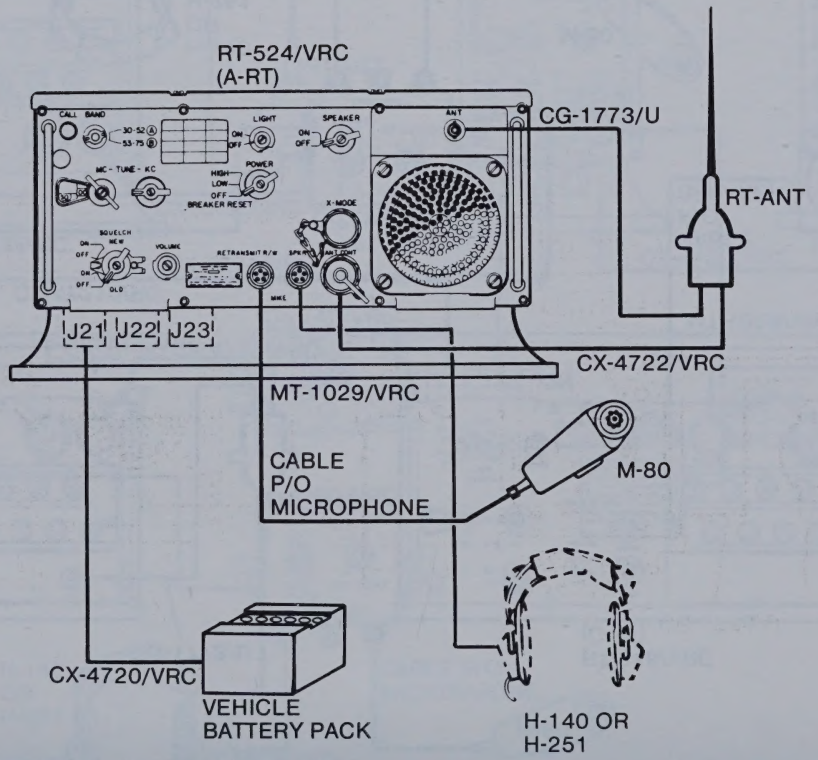


*OPTIONAL – When not available, audio accessories are connected to mike jacks of RT-246.

2-7. TYPICAL CABLING OF AN/VRC-45

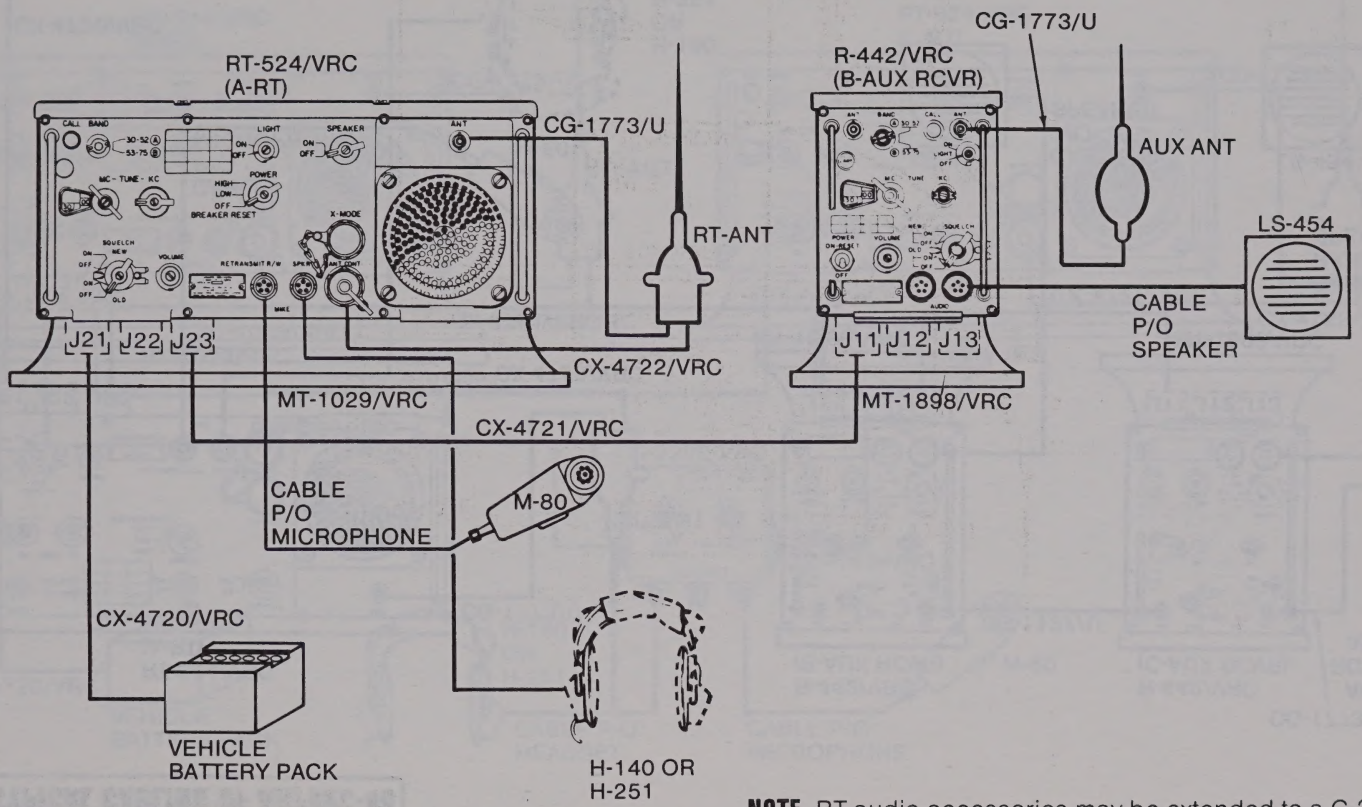


2-7. TYPICAL CABLING OF AN/VRC-46



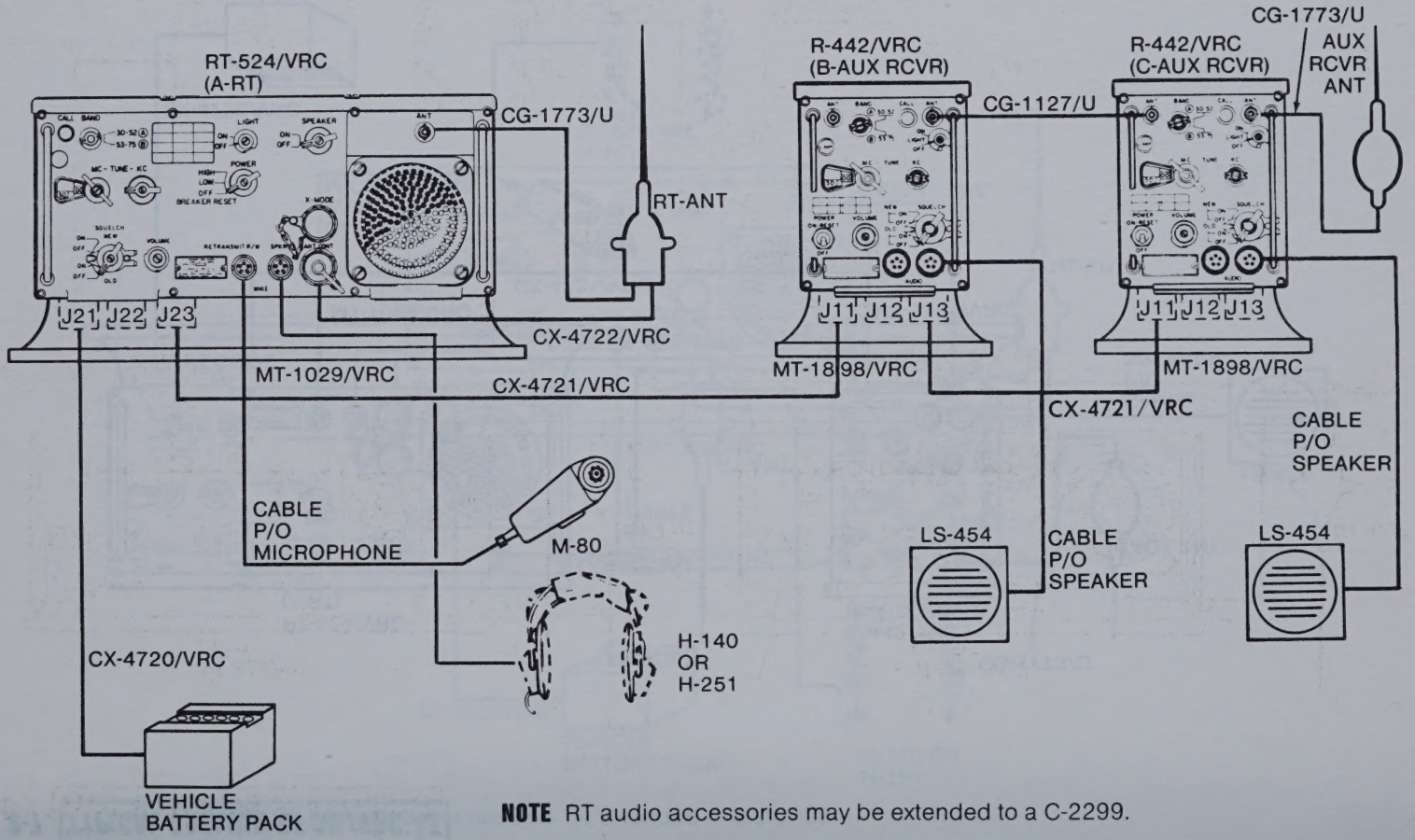
NOTE RT audio accessories may be extended to a C-2299.

2-7. TYPICAL CABLING OF AN/VRC-47



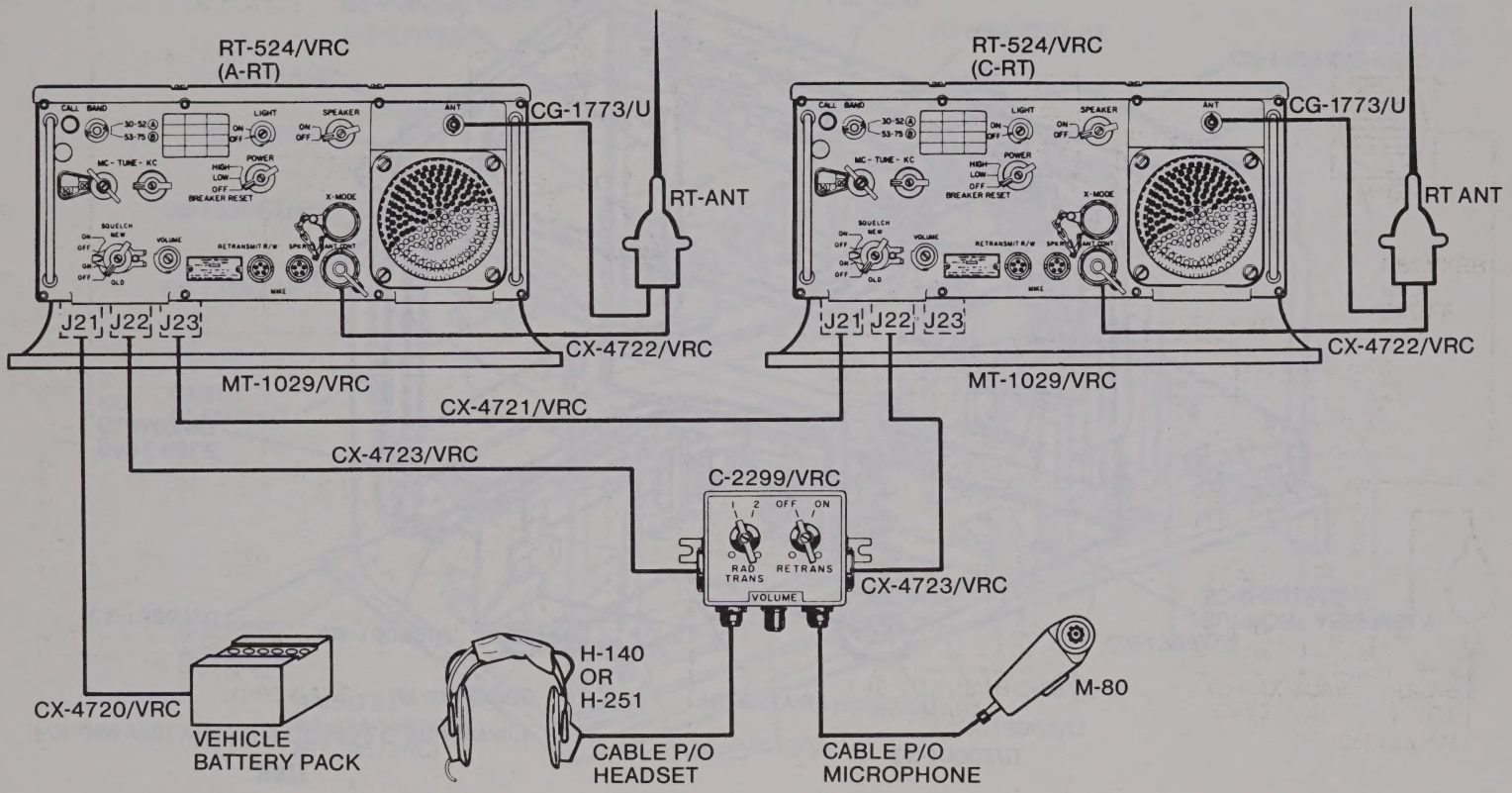
NOTE RT audio accessories may be extended to a C-2299.

2-7. TYPICAL CABLING OF AN/VRC-48



NOTE RT audio accessories may be extended to a C-2299.

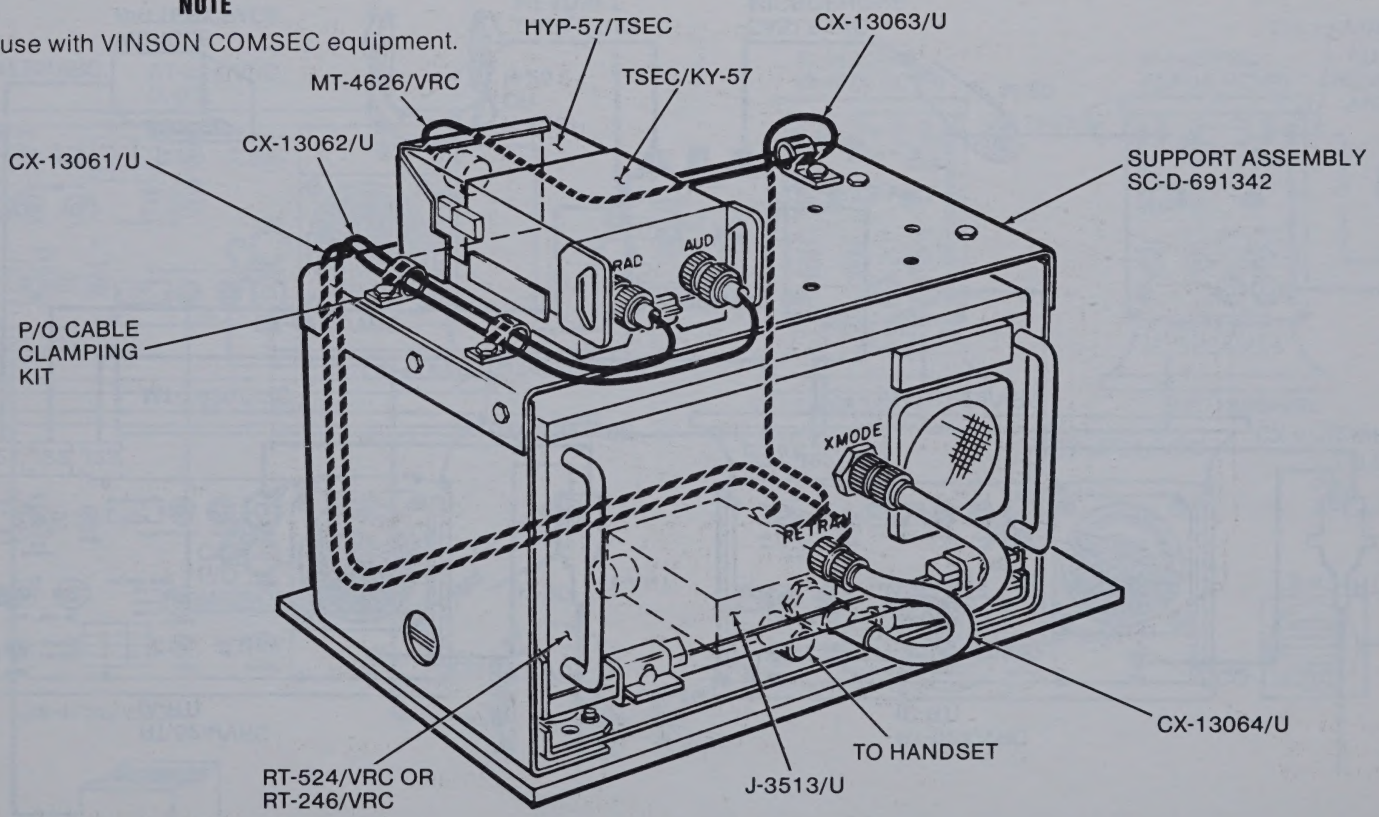
2-7. TYPICAL CABLING OF AN/VRC-49



2-7. TYPICAL CABLING OF AN/VRC-46 (-43) (VINSON)

NOTE

For use with VINSON COMSEC equipment.



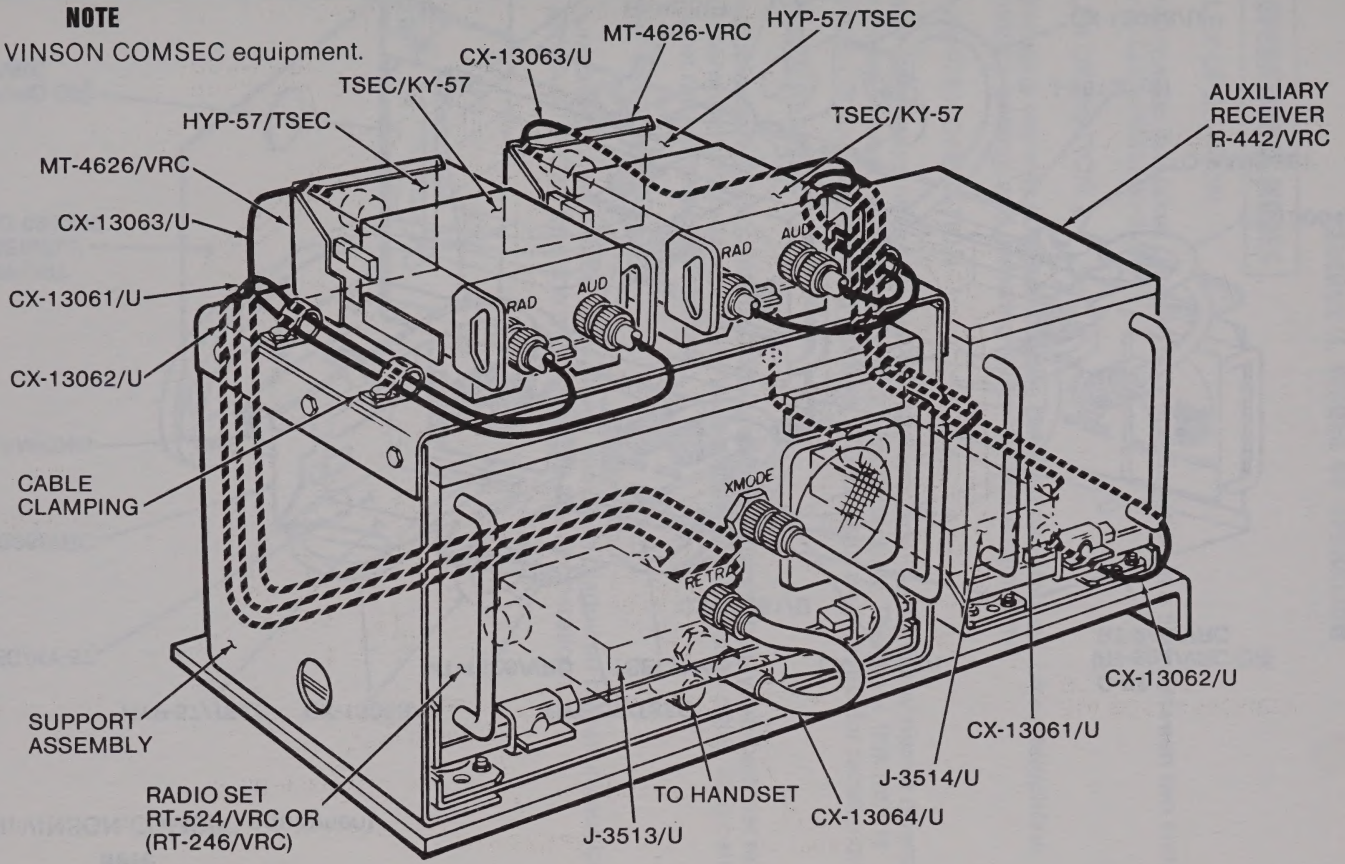
MK-1969/VRC Typical Installation to Secure AN/VRC-46

NOTE AN/VRC-43 is same except RT is RT-246/VRC.

2-7. TYPICAL CABLING OF AN/VRC-47 (-12, -44, -48) (VINSON)

NOTE

For use with VINSON COMSEC equipment.

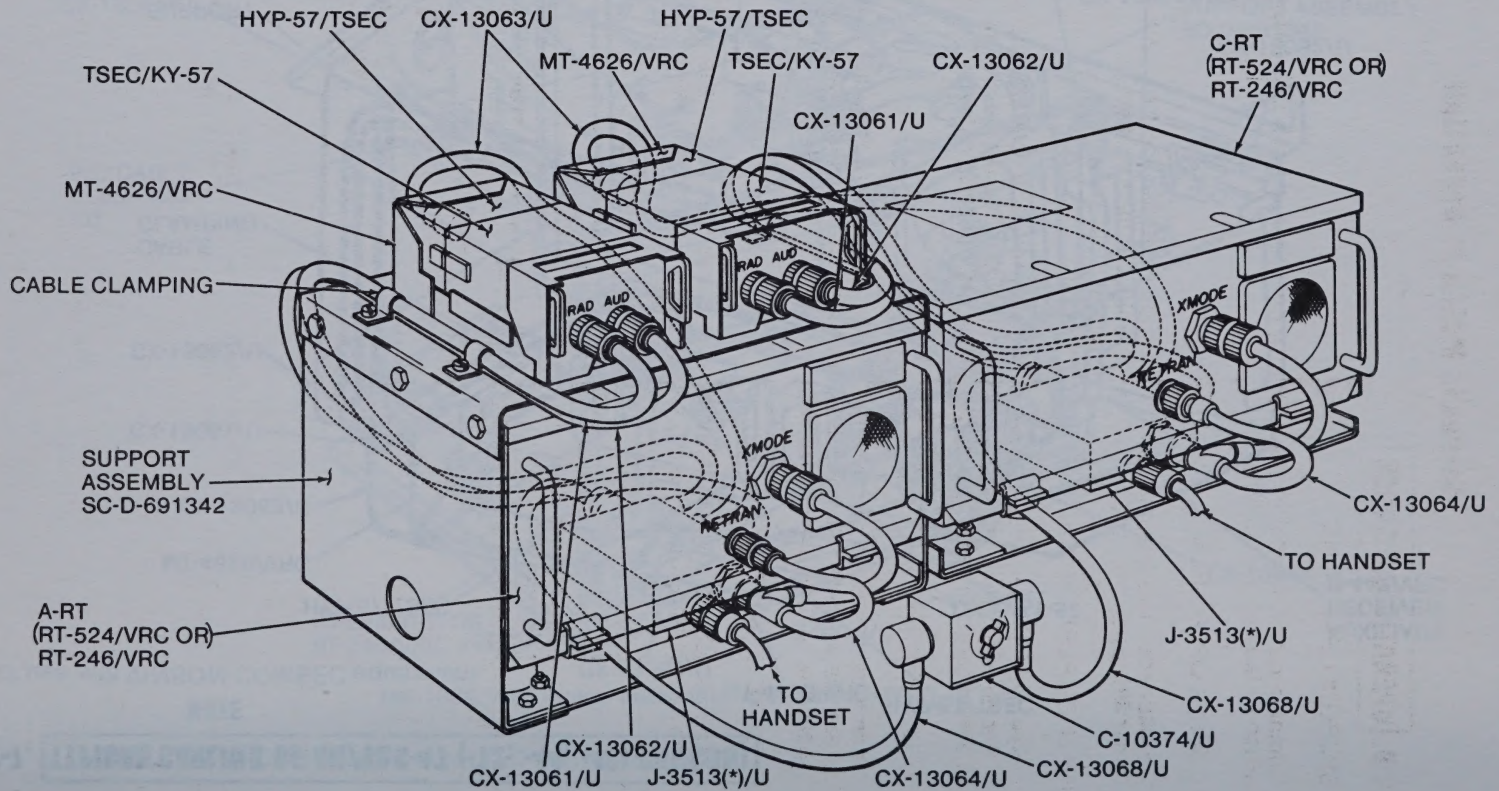


NOTE AN/VRC-12 is same except RT is RT-246/VRC. For an AN/VRC-44 and -48 VINSON CONNECTION, C-AUX RCVR is the same as B-AUX RCVR.

2-7. TYPICAL CABLING OF AN/VRC-49 (-45) (VINSON)

NOTE

For use with VINSON COMSEC equipment.



Section II. MODES OF OPERATION

2-8. OPERATIONAL MODES

SIMPLEX OPERATION

Communication that takes place in only one direction at a time between two stations. (Push-to-talk/release-to-listen.)

DUPLEX OPERATION

Simultaneous two-way communications between two stations. Like a telephone, transmitting (talking) and receiving (listening) at the same time.

HALF DUPLEX OPERATION

One-way communications between two stations. Arrangement may permit operation in either direction (send or receive), but not simultaneously. Therefore, this term is qualified by one of the following suffixes: S/O for send only or R/O for receive only.

RELAY OPERATION

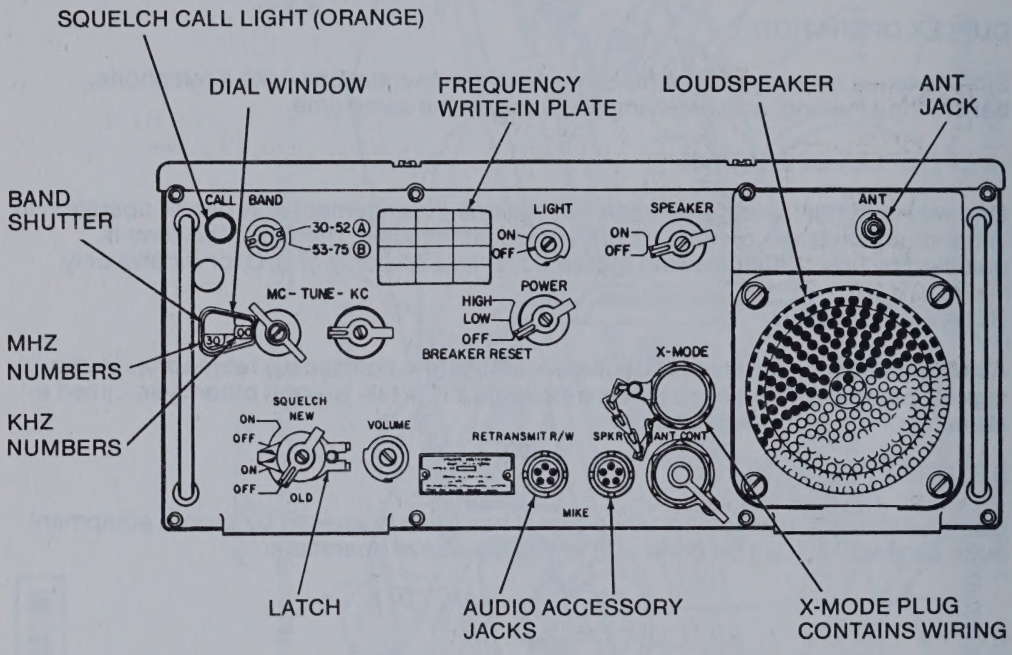
A communications (radio) set specifically set up to automatically rebroadcast radio signals between two stations that are too far apart to talk to each other. Also called a repeater or retransmission station.

SECURE OPERATION

Communications in which the voice signal has been disguised by secure equipment such as VINSON. Can be done with any of the above operations.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46

MODE OF OPERATION: SIMPLEX (PUSH-TO-TALK/RELEASE-TO-LISTEN).



FRONT PANEL

NOTE

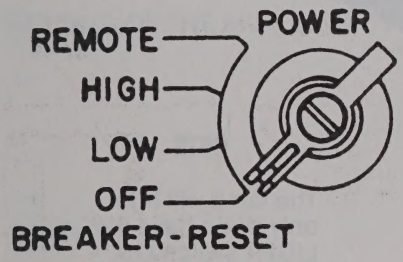
The operator's controls, indicators and jacks on the RT with speaker (RT-524(*)/VRC) are identical with those on the Push Button RT (RT-246(*)/VRC), except for push button tuning and remote control.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

SETTING OF THE POWER SWITCH

RT-246 **POWER** switch has four positions; three positions for RT-524.

OFF BREAKER-RESET Removes power from the RT and resets circuit breakers (inside the RT) if they are tripped.



LOW turns on power to RT; when RT is keyed, it transmits on low rf power (0.5 to 8 watts).

HIGH turns on power to RT; when RT is keyed, it transmits on high rf power (30 watts minimum).

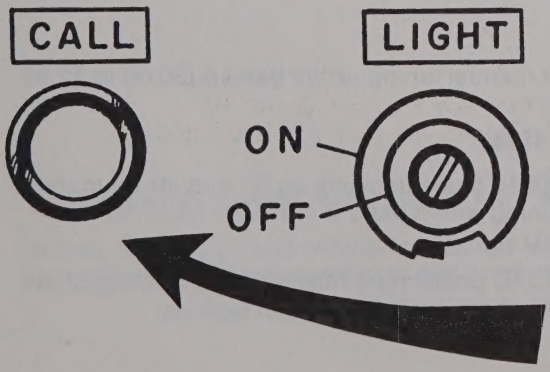
REMOTE transfers control of power and selection of RT frequency to the Remote Box (C-2742/VRC) when it is connected to the REMOTE jack on the RT-246.

NOTE

RT-524/VRC's power switch doesn't have a REMOTE position, thus no remote function.

INITIAL SETTING – POWER switch to LOW.

SETTING OF THE LIGHT SWITCH



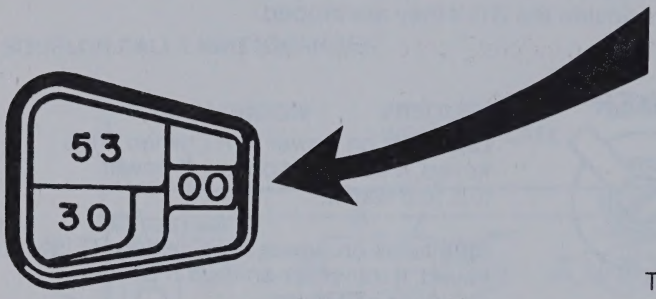
Controls power to dial window lamp.

and

to squelch CALL lamp (orange).

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

SETTING OF THE LIGHT SWITCH – Continued



NOTE

The lamp will light only if you have the LIGHT switch ON.

INITIAL SETTING – LIGHT switch to ON for dial light and power for CALL indicator lamp.

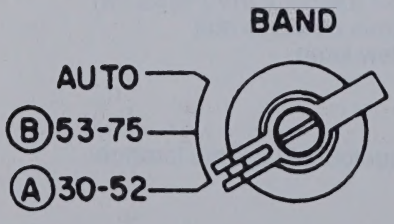
NOTE

For blackout operation, set the LIGHT switch to OFF.

SETTING OF THE BAND SWITCH

RT-246 BAND switch has three positions; two positions for RT-524.

(A) 30-52 position sets up RT circuits for manual tuning within band A (30.00 to 52.95 MHz).



(B) 53-75 position sets up RT circuits for manual tuning within band B (53.00 to 75.95 MHz).

AUTO position permits automatic tuning of the RT when you use the push buttons.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

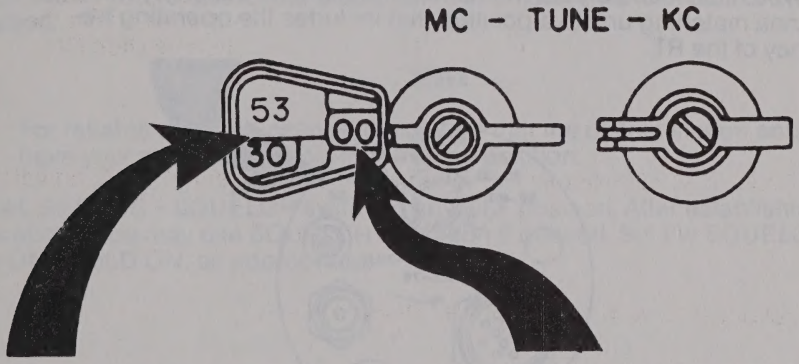
SETTING OF THE BAND SWITCH – Continued

NOTE

RT-524/VRC's BAND switch doesn't have an AUTO position, thus no automatic TUNE.

INITIAL SETTING – BAND switch to Ⓐ or Ⓑ according to assigned frequency.

SETTING OF THE MC – TUNE – KC CONTROLS



MC control provides manual tuning of RT in 1 MHz steps (30, 31; 53, 54 etc) as shown on the outer section of the dial.

KC control provides manual tuning of RT in 0.05 MHz (50 kHz) steps (00, 05, 10, 15 etc) as shown on the inner section of the dial.

NOTE

A shutter covers the MC numbers of the BAND not being used.

INITIAL SETTING – MC control for desired MHz number as seen in dial window. KC control for desired kHz number in dial window. Both according to assigned frequency.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

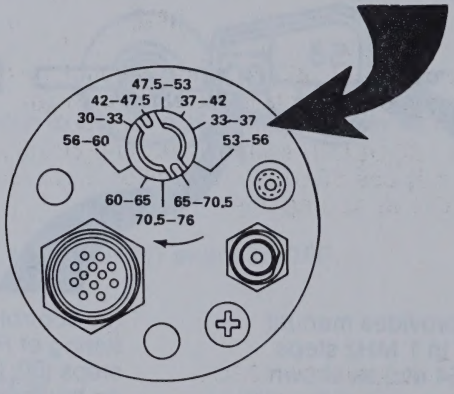
SETTING OF THE MC – TUNE – KC CONTROLS – Continued

CAUTION

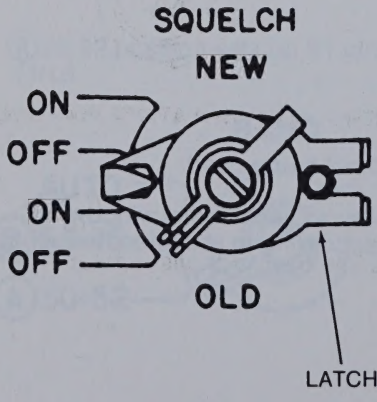
In some units of the RT-524/VRC, the KC control cannot be turned beyond the limits of 00 and 95 positions. To prevent damage to the control mechanisms of these units, do not attempt to turn the KC control beyond the 00 and 95 positions.

NOTE

If you are using either the compact or round base antenna without a cable connected from the RT ANT CONT jack to the antenna matching unit, you must manually set the band control on the bottom of the antenna matching unit to a position that includes the operating frequency of the RT.



SETTING OF THE SQUELCH SWITCH



When you are listening to an unsquelched fm receiver, you will hear a constant rushing (hissing) sound until the distant transmitter is keyed.

When the distant transmitter stops transmitting, the rushing (hissing) sound returns.

With SQUELCH, your receiver is silenced during the time the distant transmitter is not keyed. When the distant transmitter is keyed, your receiver SQUELCH circuits are automatically disabled. The call lamp will light (LIGHT switch ON), and you can hear the message.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 –Continued

SETTING OF THE SQUELCH SWITCH – Continued

The fm radio sets, like the AN/VRC-12 Series, have a new squelch design to automatically disable the distant receiver SQUELCH circuits.

Operating with newer sets, or another AN/VRC-12 Series, is normally done with all receiver and transmitter SQUELCH controls in the NEW ON positions.

but

You may be asked to communicate with some older types of fm radio sets that use an old design for disabling receiver SQUELCH circuits.

Operating your AN/VRC-12 Series with older sets is done with the receiver and transmitter SQUELCH controls in the OLD ON positions.

A latch allows you to restrict the SQUELCH switch movement to OLD or NEW squelch operation.

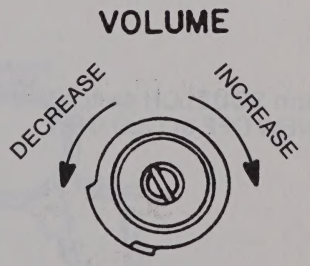
NOTE

For reliable communications, make sure that the distant station and you have your squelch controls in the same position.

INITIAL SETTING – SQUELCH switch to any OFF position. After establishing communications, you may use SQUELCH operation if desired. Set the SQUELCH switch to NEW ON or OLD ON, as appropriate.

SETTING OF THE VOLUME CONTROL

You can adjust the volume level to any loudspeaker or earphone connected to or through the RETRANSMIT R/W or SPKR jack on the front panel of the RT.



(VOLUME CONTROL IS SHOWN AT OFF POSITION)

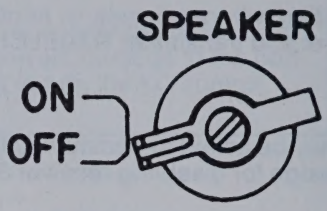
INITIAL SETTING – Mid point. After communications has been established, set VOLUME to a comfortable listening level.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

SETTING OF THE SPEAKER SWITCH

The RT with Speaker (RT-524(*)/VRC) has a built-in loudspeaker and a SPEAKER switch in place of the push buttons.

The SPEAKER switch turns the built-in loudspeaker ON or OFF



INITIAL SETTING – SPEAKER switch to ON.

VERIFY X-MODE SWITCH POSITION

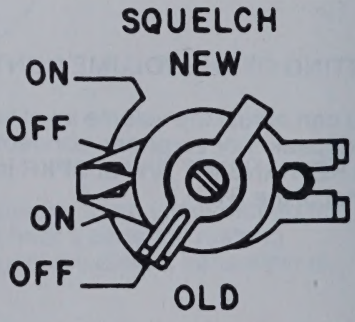
NOTE

The following apply to any RT on any type of RT mount.

The X-MODE – NORMAL switch inside your RT should be in the X-MODE position for both NORMAL and X-MODE operation.

To determine if your RT's internal switch is set to the right position (X-MODE), do the following check:

Turn SQUELCH switch to either OFF position (NEW OFF or OLD OFF).



then

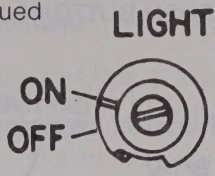
Turn VOLUME control to mid range position.

then

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

VERIFY X-MODE SWITCH POSITION – Continued

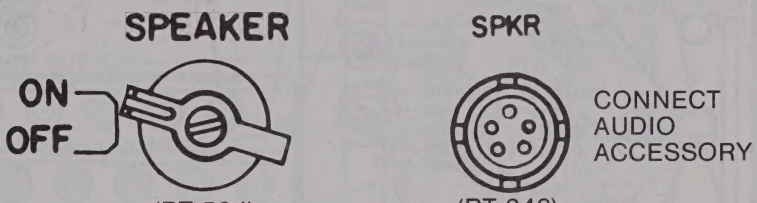
Turn LIGHT switch to ON



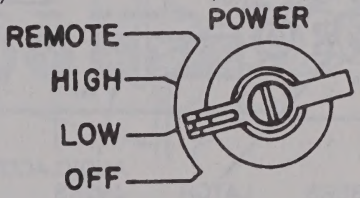
then

For RT-524, turn SPEAKER switch to ON.

For RT-246, connect an audio accessory (headset, speaker, etc) to SPKR jack.



then



Turn POWER switch to LOW.
(Dial window lamp lights.)

Rushing noise (hissing sound) should now be heard.

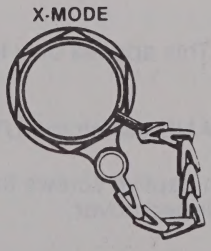
A. If it is not, your RT is defective. Operator troubleshooting is in chapter 3 of this manual.

B. If it is, proceed as follows:

Unplug X-MODE plug from RT's **X-MODE** jack.

or

Unplug VINSON cable from RT's **X-MODE** jack.



Rushing noise should disappear – not be heard.

A. If it disappears, the RT's internal X-MODE switch is set to the right position (X-MODE). But, to operate the RT you must reconnect the X-MODE plug or the VINSON cable.

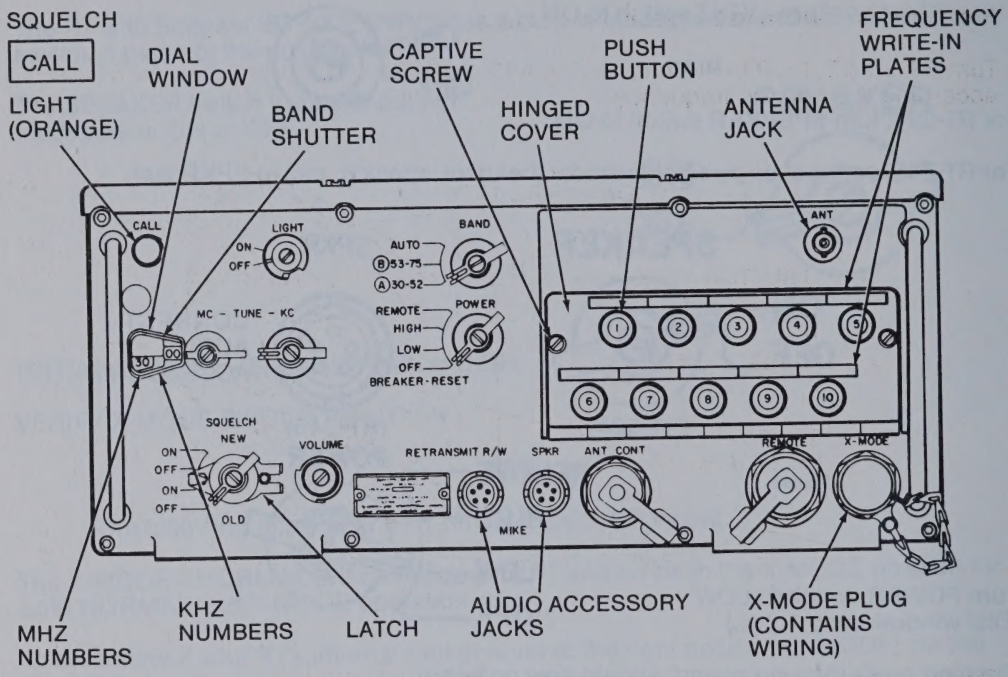
B. If it does not disappear, the RT's internal X-MODE switch is in the wrong position (NORMAL). Report this condition to C-E ORG MAINT.

CAUTION

An operator is not authorized to open any RT or aux receiver.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

PRESETTING RT-246 PUSH BUTTONS



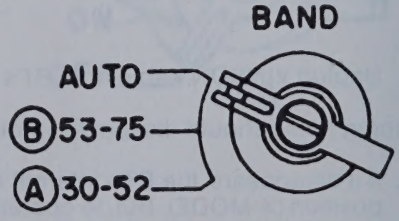
You will be required to preset each of the 10 push buttons to an authorized (assigned) channel frequency.

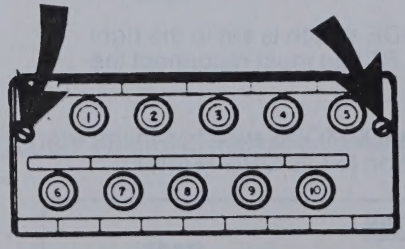
NOTE

This applies only to the push button RT (RT-246(*)/VRC).

Turn BAND switch to AUTO.

Loosen captive screws to drop hinged cover.



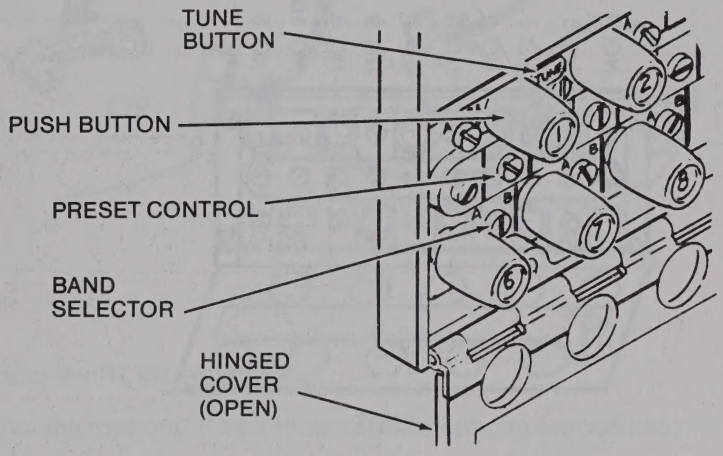


2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

PRESETTING RT-246 PUSH BUTTONS – Continued

Press in push button to be preset (one of ten).

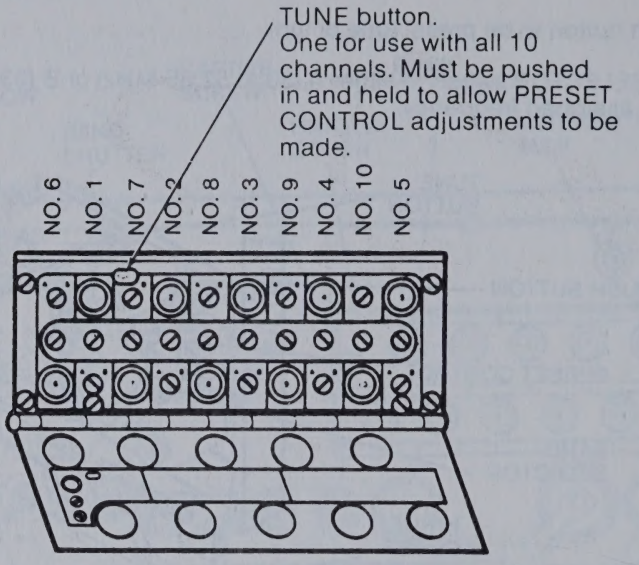
Turn BAND SELECTOR switch to either A (30 to 52.95 MHz) or B (53 to 75.95 MHz) according to assigned frequency.



Press in and hold the TUNE button and adjust PRESET CONTROL, of corresponding push button, to the correct frequency as shown in the dial window. Release the TUNE button to lock in the frequency.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

PRESETTING RT-246 PUSH BUTTONS – Continued



NOTE

- Switches contained within bracketed white lines pertain to that specifically numbered push button.
- For push buttons 1 through 5, the controls are just below the push button; for push buttons 6 through 10, the controls are just above the push buttons.

After presetting a push button, check accuracy of your adjustment.

- Change frequency by pressing in another push button.
- Press the push button that was just preset.
- RT should tune to exact frequency you preset as shown in the dial window.

Preset the other push button, as required.

Check accuracy of each push button preset.

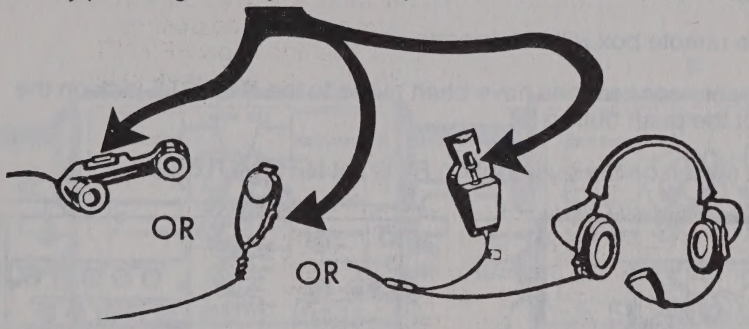
NOTE

- Remember your push buttons will only work if you have placed the RT BAND switch to AUTO.
- During push button tuning, the frequency of the channel you have selected will appear in the dial window.
- Write in the frequency for each push button on the write-in plates on the front of the hinged cover.
- Any one of 10 preset channel frequencies for the push button RT can be selected by pressing the proper push button.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

ESTABLISHING INITIAL COMMUNICATIONS

Key your RT by pressing the key switch on your audio accessory. Examples:



and

You should hear the RT blower running.

Speak into your microphone. (Use proper radio/telephone procedures.)

You should hear yourself (sidetone) in your earphone(s).

Tell the distant station to transmit to you and then release your key switch.

The sidetone should stop.

Normally the blower will stop running, but if the equipment is warm, the blower may continue running (no longer than 2 minutes).

Listen to your loudspeaker or earphone(s) for the signal from the distant station.

Adjust your VOLUME control for a comfortable listening level.

If you cannot reach the distant station on LOW power, repeat the above procedures with the POWER switch set to HIGH.

After establishing communications you may use SQUELCH operation if desired.

Set the SQUELCH switch to NEW ON or OLD ON as appropriate.

NOTE

Make sure the distant station and you have your SQUELCH controls in the same position.

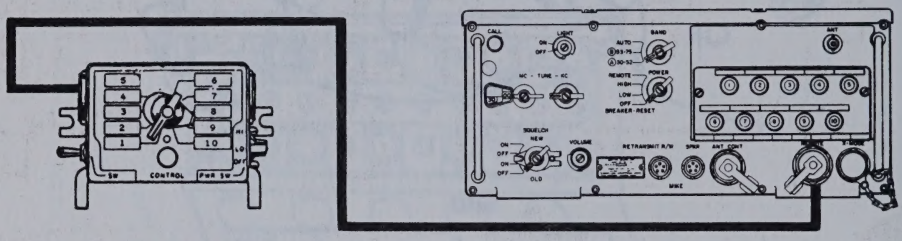
2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

REMOTE OPERATION FROM C-2742/VRC

After presetting the push buttons on your RT, you can use your remote box.

Remember, a remote box will not operate unless:

The proper cable connections have been made to the REMOTE jack on the front panel of the push button RT
and
The POWER switch on the push button RT is set to REMOTE.



REMOTE CONTROL BOX (C-2742/VRC) CONTROLS

SW switch and CONTROL indicator lamp.

SW switch is spring loaded.

When pulled and released, the CONTROL indicator lamp lights.

and

You now have control of the push button RT.

CHAN/SEL switch.

Used to select any one of the 10 preset frequencies.

PWR SW switch is used to:

Control power to the RT

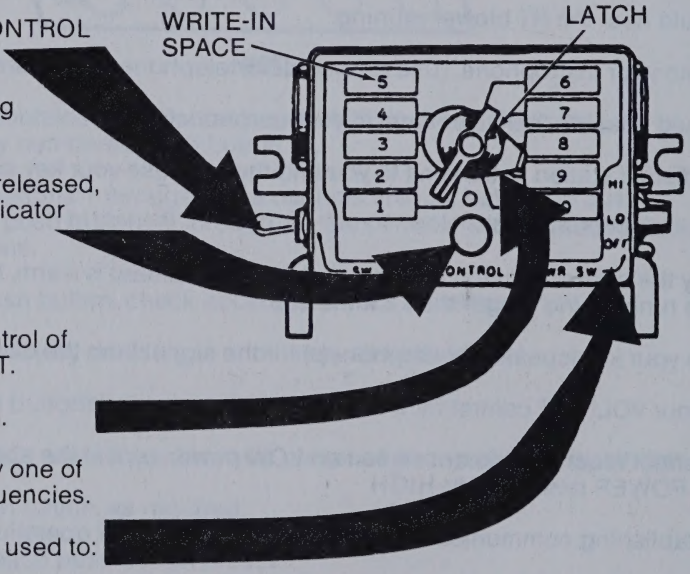
and

RT transmit power output:

OFF removes power from push button RT.

LO push button RT transmits on low power.

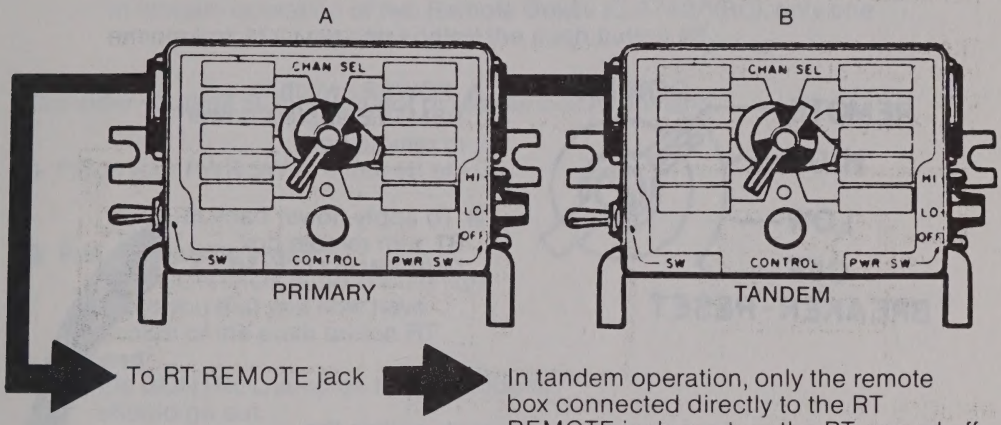
HI push button RT transmits on high power.



2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

REMOTE OPERATION FROM C-2742/VRC – Continued

Two Remote Boxes (C-2742/VRC) can be connected in tandem as shown below.



Only one remote box can control the push button RT at one time.

Pulling and releasing SW toggle switch on your remote box will:

make your CONTROL lamp light

and

the CONTROL lamp on the other box to go out

and

your CONTROL lamp will stay lighted, indicating you have control of the RT.

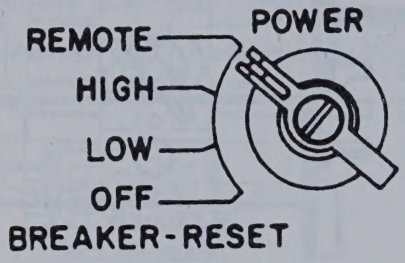
NOTE

- During remote operation, the frequency of the channel you selected will appear in the RT dial window.
- Don't forget to write in the preset frequencies on the space provided on the front of the REMOTE BOX.
- To return control of the push button RT to its front panel controls, turn the push button RT POWER switch from REMOTE to HI or LO.

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

REMOTE OPERATION FROM C-2742/VRC – Continued

INITIAL SETTING – This step applies only to push button RT (RT-246(*)/VRC) with push buttons operating properly and Remote Box (C-2742/VRC) connected to the RT REMOTE jack.



A POWER switch to REMOTE applies power to remote box.

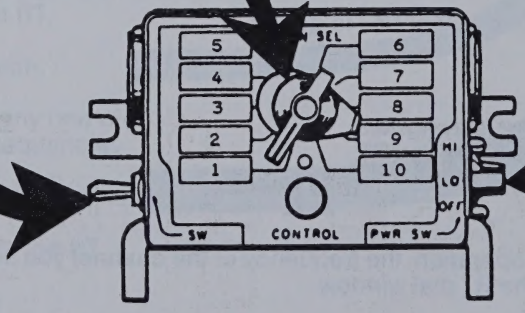
B To apply power back to RT, turn remote box PWR SW to LO or HI.

C Activate your remote box by momentarily pulling the SW spring-loaded switch.

D The CONTROL indicator lamp should light and you can now control the RT from the remote box.

E To change RT transmit power, turn the PWR SW to HI or LO as desired.

F To change RT operating frequency, turn the CHAN SEL switch to the position that has been assigned to the desired frequency.



NOTE

On the CHAN SEL switch, position 1 corresponds to push button 1; position 2, to push button 2; position 3, to push button 3; etc.

G To turn off the RT, turn the PWR SW to OFF. The CONTROL indicator lamp should go out and the dial lamp on the RT should go out (primary remote box only).

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

REMOTE OPERATION FROM C-2742/VRC – Continued

NOTE

In tandem operation of two Remote Boxes (C-2742/VRC), only one remote box at a time can control the push button RT.

Consider yourself as the operator of remote box A (primary).

A Place your PWR SW to either HI or LO.

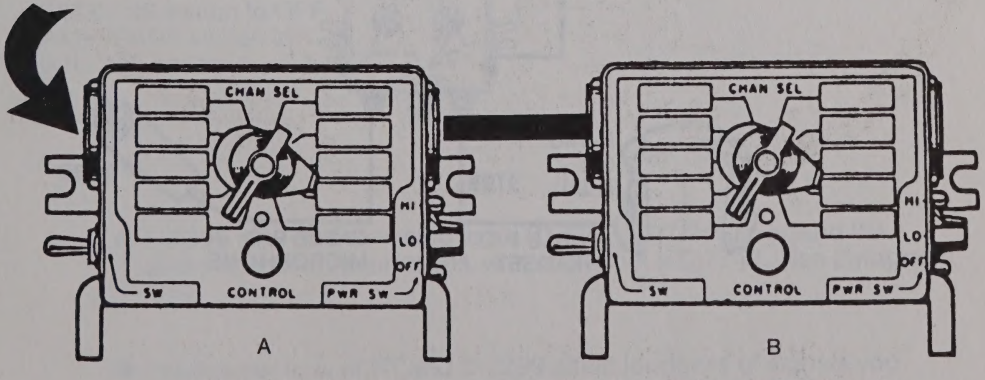
B Pull your toggle switch:
Your CONTROL lamp should light to tell you that you now have control of the push button RT
and
the CONTROL lamp on box B (tandem) should go out.

C To return control of the RT to the front panel controls on the RT, turn the POWER switch on the RT from REMOTE to HIGH or LOW.

NOTE

In tandem operation, only the remote box connected to the push button RT can turn the RT on and off. In the drawing shown, this is box A (primary).

To RT REMOTE jack.



(PRIMARY) (TANDEM)

2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

EXTENDED AUDIO ACCESSORIES FUNCTIONS TO C-2299/VRC

Relay Box C-2299 provides radio relay operation for the AN/VRC-45 and AN/VRC-49 Radio Sets. It is also used to extend the RT audio accessories functions for the other six Radio Sets of the AN/VRC-12 Series.

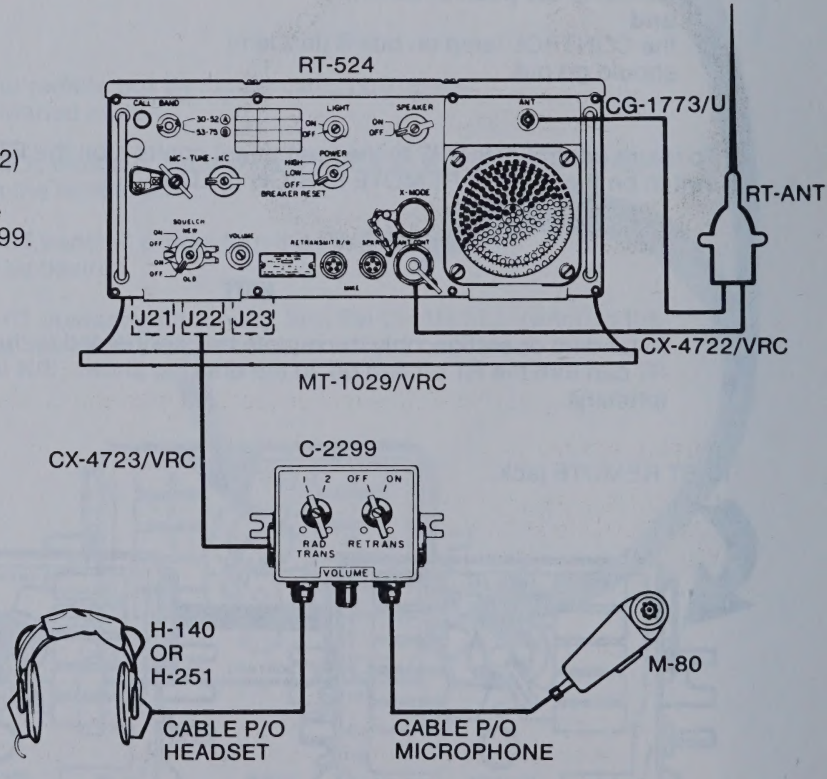
Remember, a relay box will not operate unless:

The proper cable connections have been made between the RT's mount (center jack on bottom of J-box and the left-side jack of the C-2299).

The RT controls are set up for initial communications.

NOTE

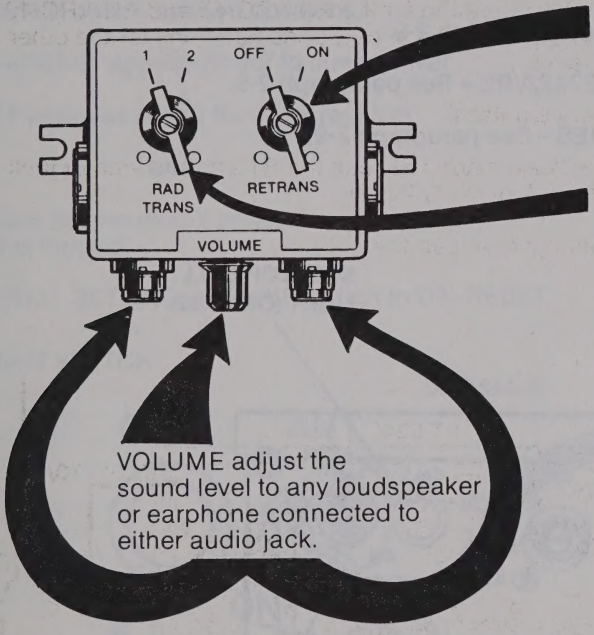
Aux Receiver (R-442) audio accessory's function can not be extended to a C-2299.



2-9. OPERATING THE AN/VRC-43 AND AN/VRC-46 – Continued

EXTENDED AUDIO ACCESSORIES FUNCTIONS TO C-2299/VRC – Continued

RELAY BOX (C-2299/VRC) CONTROLS



RETRANS switch
OFF permits extension of audio accessory's function from C-2299 to RT.
ON does not permit extension of audio accessory function.

RAD TRANS switch

1. Connects audio accessory functions to RT.
2. Disconnects audio accessory functions from RT.

VOLUME adjust the sound level to any loudspeaker or earphone connected to either audio jack.

NOTE

See paragraph 2-5 for audio accessory types and connections.

INITIAL SETTINGS –

RETRANS switch to OFF.
RAD TRANS switch to 1.
VOLUME control to mid-point.

NOTE

- C-2299 may be connected to an RT-524 or RT-246 to extend the audio accessory's functions, with or without a C-2742. (See paragraph 2-7.)

- Volume controls of RT and C-2299 affect loudness of signals you hear. If either is at zero (fully CCW), no signal will be heard.

CABLING – See paragraph 2-7 as it applies to the AN/VRC-43 and AN/VRC-46.

2-10. OPERATING AN/VRC-12 AND AN/VRC-47

MODES OF OPERATION

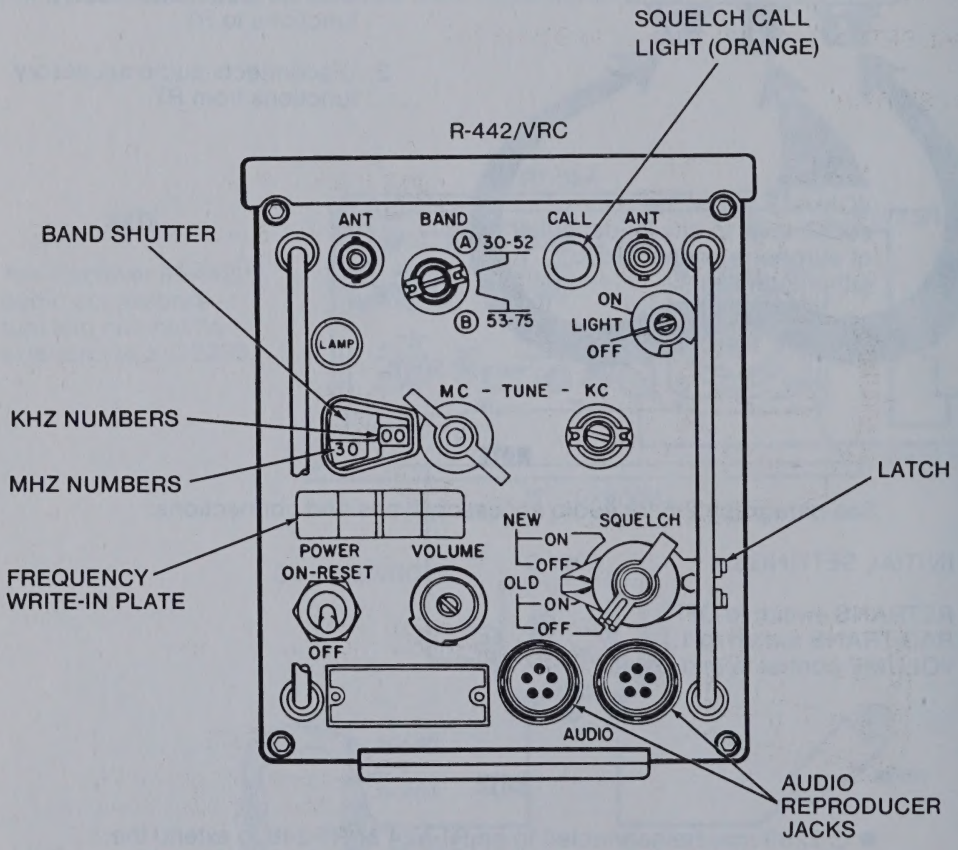
A Duplex
B RT simplex and R-442 half duplex (receive only).

SETTING THE RT CONTROLS – See paragraph 2-9.

REMOTE OPERATION USING C-2742/VRC – See paragraph 2-9.

EXTENDING AUDIO ACCESSORIES – See paragraph 2-9.

SETTING R-442 CONTROLS.



2-10. OPERATING AN/VRC-12 AND AN/VRC-47 – Continued

SETTING OF THE R-422 CONTROLS – Continued

POWER SWITCH

POWER switch has two positions.

ON-RESET applies power to aux receiver

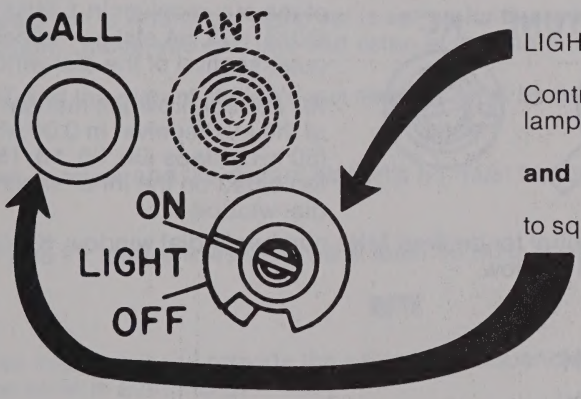
OFF removes power from aux receiver

and

resets built-in circuit breaker if it is tripped.

INITIAL SETTING – POWER switch to ON-RESET

LIGHT SWITCH

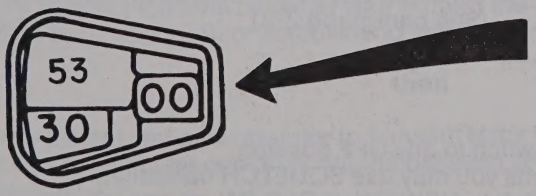


LIGHT switch.

Controls power to dial window lamp

and

to squelch CALL lamp (orange).



Lamp to light the DIAL WINDOW

NOTE

The lamp will light only if you have the LIGHT switch ON.

INITIAL SETTING – LIGHT switch to ON for dial light and power for CALL indicator lamp.

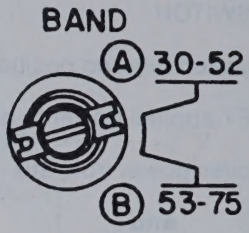
NOTE

For black out operation, set the LIGHT switch to OFF.

2-10. OPERATING AN/VRC-12 AND AN/VRC-47 – Continued

SETTING OF THE R-442 CONTROLS – Continued

BAND SWITCH



BAND switch has two positions.

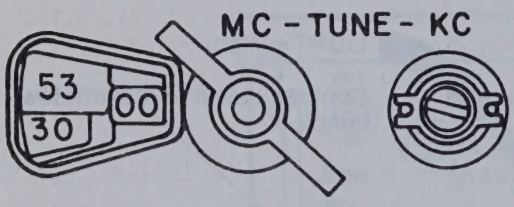
(A) 30-52 position sets up aux receiver for tuning within band A (30.00 to 52.95 MHz).

(B) 53-75 position sets up aux receiver for tuning within band B (53.00 to 75.95 MHz).

INITIAL SETTING – BAND switch to (A) or (B) according to assigned frequency

MC – TUNE – KC CONTROL

Your aux receiver can only be tuned manually using the MC and KC controls.

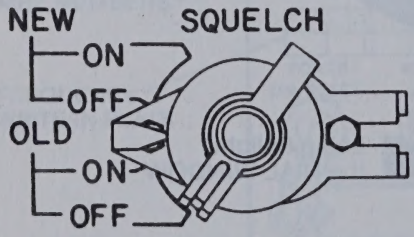


MC control provides manual tuning of the aux receiver in 1 MHz steps (30, 31; 53, 54 etc) as indicated on the outer section of the dial window.

KC control provides manual tuning of the aux receiver in 0.05 MHz (50 kHz) steps (00, 05, 10, 15 etc) as indicated on the inner section of the dial window.

INITIAL SETTING – MC control for desired MHz number in dial window. KC control for desired kHz number in dial window.

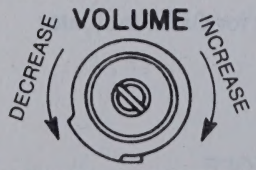
SQUELCH SWITCH



The aux receiver SQUELCH control is operated the same way as the SQUELCH control on the RT. (See paragraph 2-9.)

INITIAL SETTING – SQUELCH switch to any OFF position. After establishing communications you may use SQUELCH operation, if desired. Set the SQUELCH switch to NEW ON or OLD ON, as appropriate.

VOLUME CONTROL



(VOLUME CONTROL IS SHOWN AT OFF POSITION)

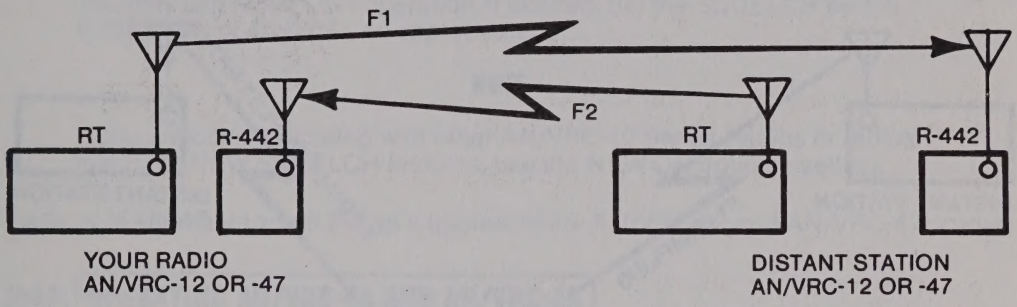
You can adjust the volume level to any audio reproducer (loudspeaker or earphone) connected to the AUDIO jacks on the aux receiver front panel.

INITIAL SETTING – VOLUME control for comfortable listening level.

2-10. OPERATING AN/VRC-12 AND AN/VRC-47 – Continued

SETTING OF THE R-442 CONTROLS – Continued

ESTABLISHING INITIAL DUPLEX COMMUNICATIONS



Duplex operation is when your radio set is set up for two-way communications with a distant station. That is, you can talk and listen at the same time, like a telephone.

- Your RT and the distant station's aux receiver must be tuned to the same frequency (F1).
- Your aux receiver and the distant station's RT must be tuned to the same frequency (F2).
- The F1 and F2 frequencies must be at least 10 MHz apart.

NOTE

Your supervisor will provide the assigned frequencies when duplex operation is authorized.

- After doing the initial setting of your RT and aux receiver controls, establish satisfactory communications between your RT and the distant stations aux receiver on F1. (See paragraph 2-9 for establishing initial communications.)

then

- Ask the distant station's operator to transmit back to your aux receiver on F2 and establish satisfactory communications between your aux receiver and the distant station's RT.

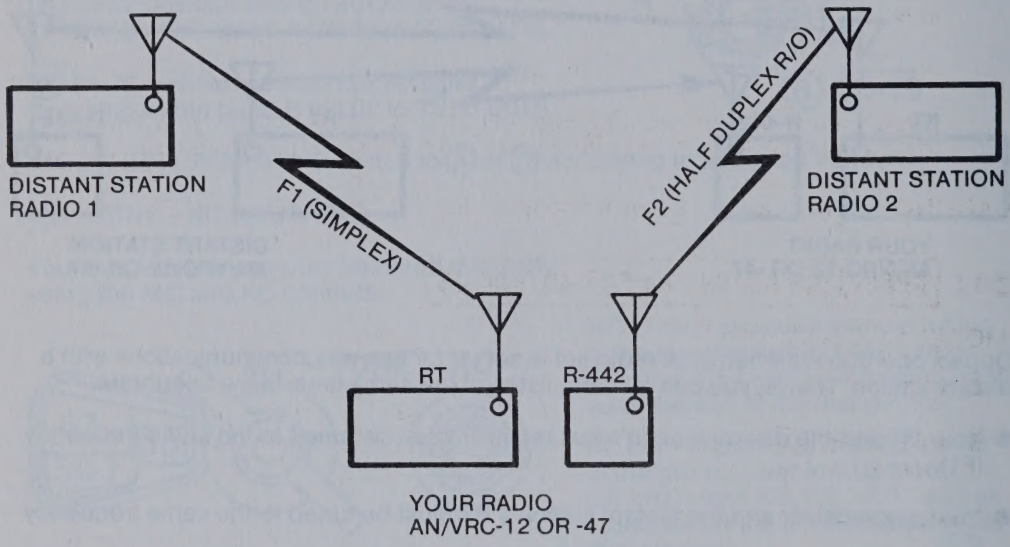
- After establishing communications, both ways, you may use SQUELCH operation, if desired. Set the SQUELCH switch to NEW ON or OLD ON, as appropriate.

but

Make sure the distant station and you are using the same SQUELCH settings.

2-10. OPERATING AN/VRC-12 AND AN/VRC-47 – Continued

ESTABLISHING INITIAL SIMPLEX AND HALF DUPLEX COMMUNICATIONS



Sometimes you will operate in simplex with your RT and a distant station (e.g., radio 1) on one frequency (F1) while monitoring another distant station (half duplex, receive only) on another frequency (F2 of radio 2).

- Your RT and radio 1 must be tuned to the same frequency (F1).
- Your aux receiver and radio 2 must be tuned to the same frequency (F2).
- The F1 and F2 frequencies must be at least 10 MHz apart.
- After doing the initial setting of your RT and aux receiver controls, establish satisfactory communications between your RT and radio 1 on F1. (See paragraph 2-9 for establishing initial communications.)

then

- Retune your RT to F2 and ask the distant station operator of radio 2 to transmit back to your aux receiver on F2 and establish satisfactory communications between your aux receiver and distant station radio 2.
- After establishing communications on F2, retune your RT to F1.

2-10. OPERATING AN/VRC-12 AND AN/VRC-47 – Continued

NOTE

If you desire to respond to radio 2, you must retune your RT to F2, but remember to retune to F1 after you have completed your response.

You may use SQUELCH operation, if desired. Set the SQUELCH switch to NEW ON or OLD ON, as appropriate.

NOTE

If you are communicating with other AN/VRC-12 Series Radios or radios that have NEW SQUELCH features, use the NEW ON squelch setting.

CABLING – See paragraph 2-7 as it applies to the AN/VRC-12 and AN/VRC-47.

2-11. OPERATING AN/VRC-44 AND AN/VRC-48

MODES OF OPERATION

A A-RT simplex with B and C receiver in half duplex (receive only).

B A-RT and one aux receiver in duplex with other aux receiver in half duplex (receive only).

SETTING OF RT CONTROLS – See paragraph 2-9.

A-RT REMOTE OPERATION USING C-2742/VRC – See paragraph 2-9.

EXTENDING THE A-RT's AUDIO ACCESSORIES – See paragraph 2-9.

SETTING OF THE R-442/VRC CONTROLS – See paragraph 2-10.

ESTABLISHING INITIAL RECEPTION – See paragraph 2-10.

CABLING – See paragraph 2-7 as it applies to the AN/VRC-44 and AN/VRC-48.

2-12. OPERATING AN/VRC-45 AND AN/VRC-49

MODES OF OPERATION

A A-RT simplex and C-RT simplex.

B A-RT and C-RT relay (retransmission).

SETTING OF A-RT AND C-RT CONTROLS – See paragraph 2-9.

REMOTE OPERATION USING C-2742/VRC – See paragraph 2-9.

EXTENDING THE RT AUDIO ACCESSORIES – See paragraph 2-9.

2-12. OPERATING AN/VRC-45 AND AN/VRC-49 – Continued

NOTE

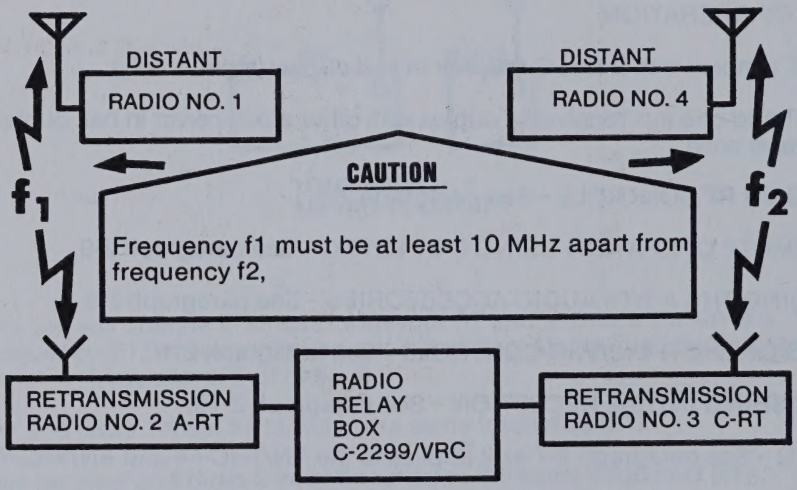
Initial setting of the C-2299/VRC, RAD TRANS switch to 1 for A-RT, RAD TRANS switch to 2 for C-RT.

- ESTABLISH INITIAL COMMUNICATIONS, SIMPLEX MODE – See paragraph 2-9.
- ESTABLISH RELAY COMMUNICATIONS – For radio relay operation, a Relay Box (C-2299) must be connected between the two RT's of the AN/VRC-45 or AN/VRC-49.

ESTABLISH RELAY COMMUNICATIONS – Continued

NOTE

This applies to Radio Set AN/VRC-45 or AN/VRC-49 when hooked up for radio relay operation using the Relay Box C-2299/VRC.



RADIO SET AN/VRC-45 or AN/VRC-49

NOTE

C-E ORG MAINT has the Interfering Frequencies Charts.

A Establish satisfactory communications between distant radio No.1 and your A-RT, retransmission radio No. 2 on frequency f1.

B Establish satisfactory communications between distant radio No. 4, and your C-RT, retransmission radio No. 3 on frequency f2.

2-12. OPERATING AN/VRC-45 AND AN/VRC-49 – Continued

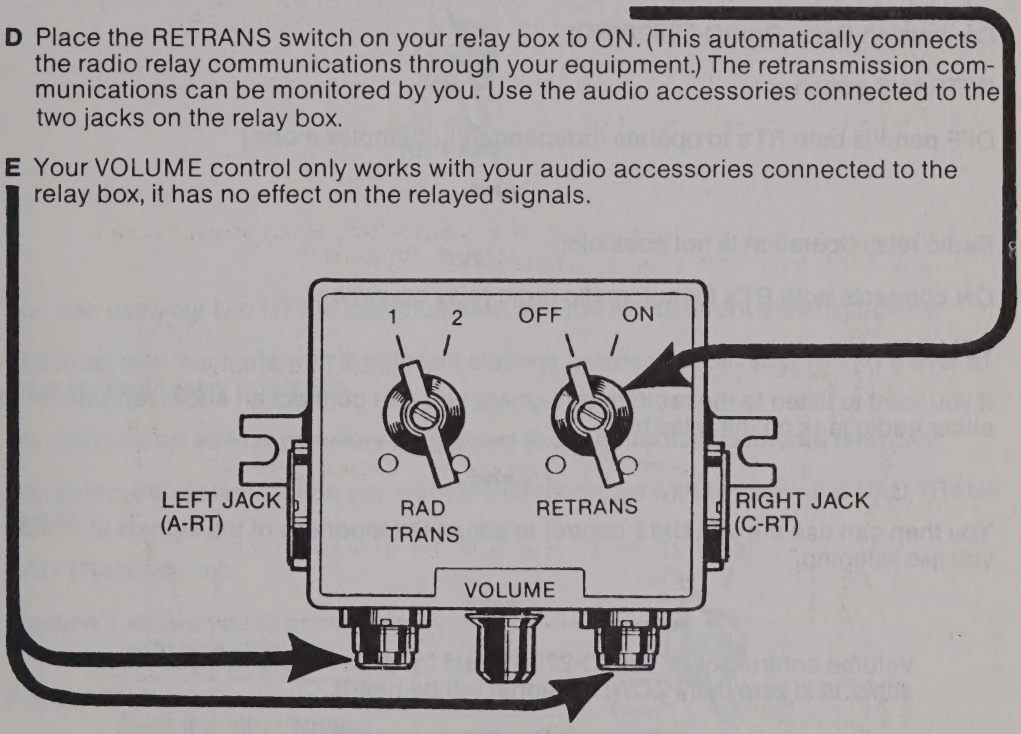
but

Make sure that all RT's in the relay hookup have their SQUELCH controls set in the same SQUELCH-ON mode, either NEW ON or OLD ON.

C After establishing initial communication (simplex mode) notify each distant radio to communicate with each other, relay mode.

D Place the RETRANS switch on your relay box to ON. (This automatically connects the radio relay communications through your equipment.) The retransmission communications can be monitored by you. Use the audio accessories connected to the two jacks on the relay box.

E Your VOLUME control only works with your audio accessories connected to the relay box, it has no effect on the relayed signals.



F Turn the RETRANS switch to OFF to stop radio relay operation.

Now each RT can operate independently.

and

The audio accessories connected to the Relay Box (C-2299/VRC) can only work with one RT at a time.

G Turn the RAD TRANS switch to position 1. The audio accessories connected to the relay box now operate with the RT connected to the left jack on the relay box.

or

Turn the RAD TRANS switch to position 2. Now the audio accessories operate with the RT connected to the right jack.

2-12. OPERATING AN/VRC-45 AND AN/VRC-49 – Continued

NOTE

When radio set is VINSON secured, a C-10374/U is used instead of Relay Box C-2299/VRC. For complete operation, refer to TM 11-5810-256-OP-5.

ESTABLISH RELAY COMMUNICATIONS – Continued

Controls on Relay Box (C-2299/VRC).

RETRANS switch.

OFF permits both RT's to operate independently. (Simplex mode.)

and

Radio relay operation is not possible.

ON connects both RT's for automatic radio relay operation.

VOLUME control.

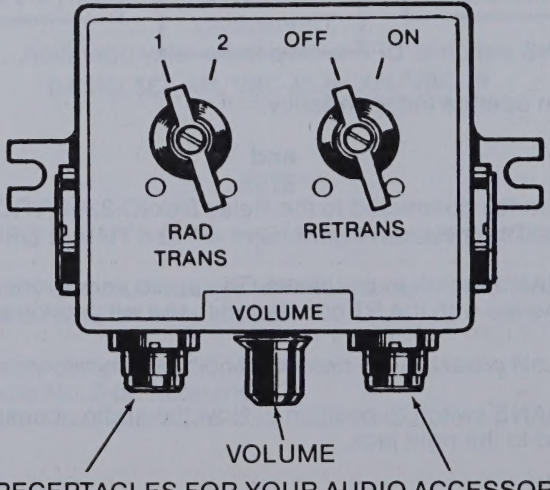
If you want to listen to the radio relay signals, you can connect an audio reproducer to either audio jack on the relay box.

and

You then can use the VOLUME control to adjust the loudness of the signals to which you are listening.

NOTE

Volume controls of RT and C-2299 affect loudness of signals you hear. If either is at zero (fully CCW) no signal will be heard.



2-12. OPERATING AN/VRC-45 AND AN/VRC-49 – Continued

ESTABLISH RELAY COMMUNICATIONS – Continued

With the RETRANS switch on your relay box at OFF, you do not have retransmission (radio relay) capability.

but

You can use your two RT's to communicate with the two different distant stations.

You must communicate with the distant stations before you turn your two RT's over to them for radio relay operation.

You can use an audio accessory connected to either audio jack on the relay box.

You select the distant station you want to communicate with by using the RAD TRANS switch.

RAD TRANS switch.

Position 1 allows you to communicate with one station.

Position 2 allows you to communicate with the other station.

and

After you have communicated and coordinated with both stations, you place your RETRANS switch to ON.

now

Your two RT's are under the control of the stations for radio relay operation.

CAUTION

If VINSON COMSEC equipment is used in the communications system, you must use VINSON Relay Box C 10374/VRC in place of Radio Relay Box (C-2299/VRC).

CABLING – See paragraph 2-7 as it applies to the AN/VRC-45 and AN/VRC-49.

2-13. OPERATING TSEC/KY-57

● FILL switch.

Selects the desired scrambling circuits in the VINSON equipment.

● MODE switch.

Has four positions.

P for plain (not secure) communications through the radio equipment.

C for CIPHER (secure) communications through the radio equipment.

NOTE

You can receive PLAIN (not secure) signals in the C position.

LD used when loading the VINSON scrambler circuits.

RV used for special secure operations.

● VOLUME control.

May be used with the other volume controls on the radio and intercom equipment.

● POWER/TIME DELAY switch.

Has three positions.

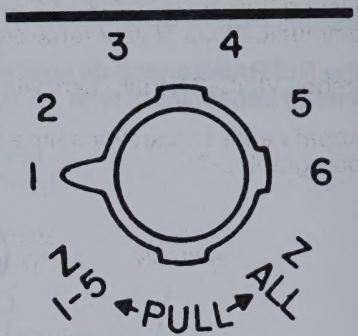
ON applies power to VINSON equipment.

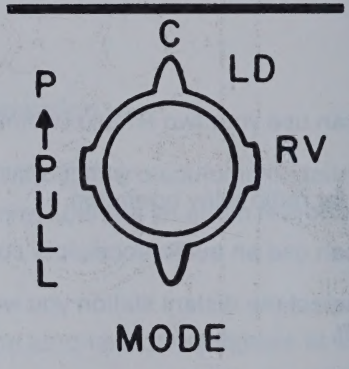
OFF removes power.

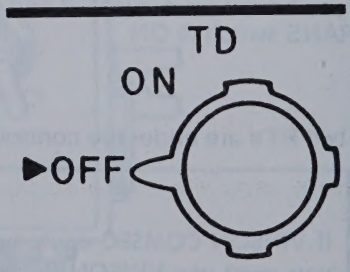
TD provides time delay operation.

NOTE

For complete operating instructions using VINSON, refer to TM 11-5810-256-OP-3A





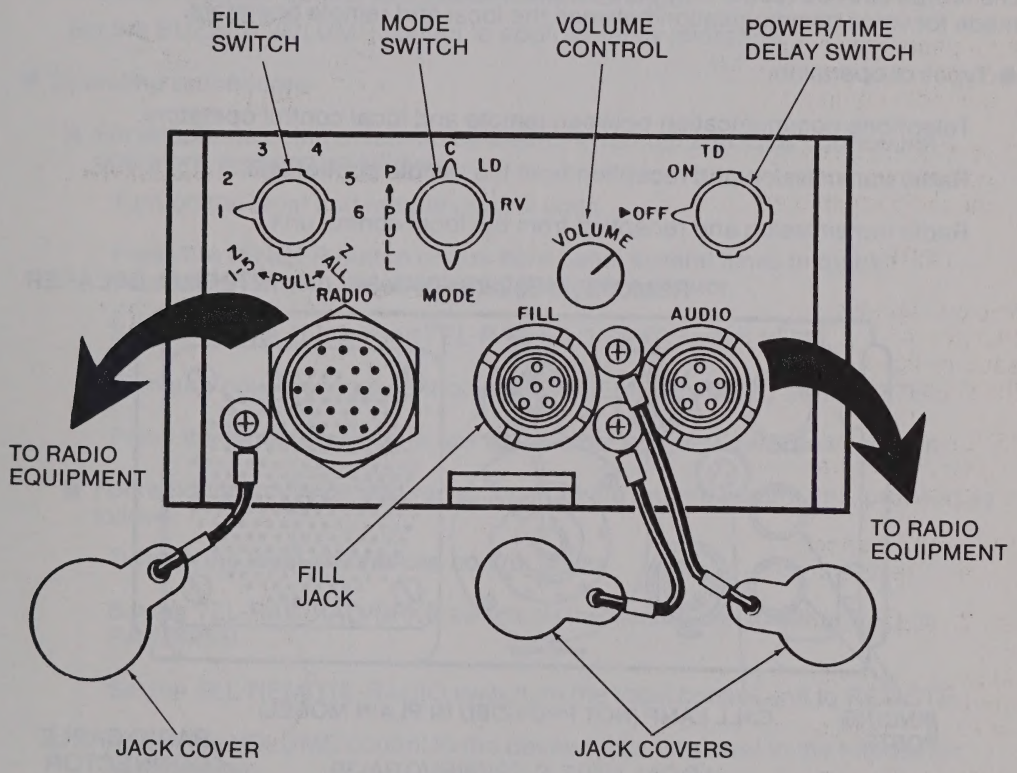


2-13. OPERATING TSEC/KY-57 – Continued

VINSON equipment (TSEC/KY-57 and HVP-57/TSEC) provides for securing (CIPHER) the communications of your radio set.

Remember, VINSON equipment will not operate unless:

The proper cable connections have been made between the RT and aux receivers. (See paragraph 2-7.)



● JACKS.

RADIO and AUDIO jacks are connected by cables to the radio equipment.

FILL jack is used with special equipment for load/change the VINSON "scrambling" circuits.

NOTE

When cables are removed from any of the three jacks, cover the jack with its cover.

The radio components are turned on and the VINSON controls are properly set.

2-14. REMOTE OPERATIONS

REMOTE OPERATION OF RT FROM THE AN/GRA-39

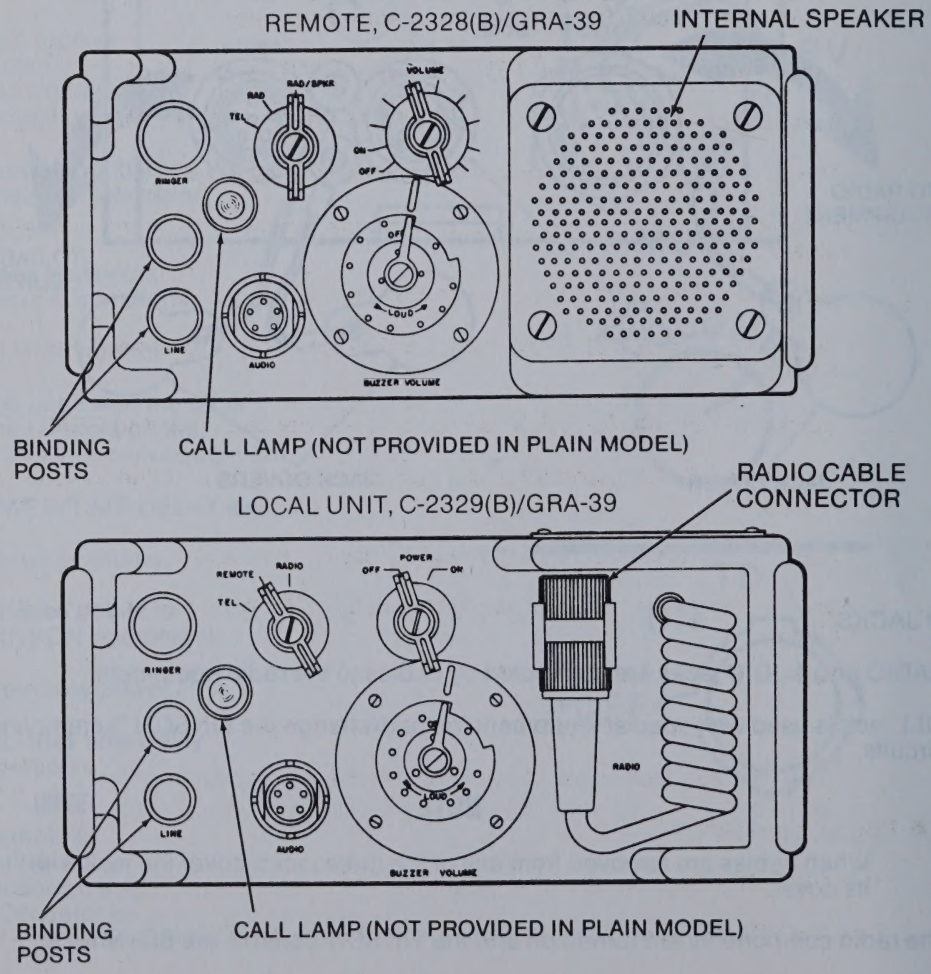
Radio Set Control Group AN/GRA-39(B) is used with Radio Sets AN/VRC-12, AN/VRC-43 through 49, and other similar tactical radio sets. The AN/GRA-39(B) allows voice transmission or reception through a radio set from a maximum distance of 2 miles (3.2 km) over Field Wire WD-1(*)/TT. Voice transmission or reception through the radio set is established from either the C-2328(B)/GRA-39 (Remote Control Unit) or C-2329(B)/GRA-39 (Local Control Unit) at the option of the operator. Provision is also made for voice communication between the local and remote operators.

- Types of operation.

  Telephone communication between remote and local control operators.

  Radio transmission and reception from the remote control unit.

  Radio transmission and reception from the local control unit.



2-14. REMOTE OPERATIONS – Continued

- Starting procedure for local control unit.

  Turn the POWER switch to ON.

  Set the BUZZER VOLUME control to approximately midrange.

- Starting procedure for remote control unit.

  Turn the VOLUME control to approximately midrange.

  Set the BUZZER VOLUME control to approximately midrange.

- Operating procedures.

  A For telephone communication between the remote and local control unit operators, proceed as follows:

  Turn on the local and remote control units.

  Press the RINGER button on the front panel several times in quick succession to gain the attention of the other operator.

  Set the remote control unit TEL-RAD-RAD/SPKR switch to TEL.

  Turn and hold the local control unit TEL-REMOTE-RADIO switch to TEL.

  Press the handset switch to talk to the other operator; release it to listen.

  B For radio transmission and reception from the remote control unit, proceed as follows:

  Turn on the local and remote control units.

  Set the TEL-RAD-RAD/SPKR switch on the remote unit to either RAD or RAD/SPKR.

  Set the TEL-REMOTE-RADIO switch on the local control unit to REMOTE.

  Adjust the VOLUME control to the desired listening level in the handset or loudspeaker.

  Press the handset switch to transmit; release it to receive.

  C For radio transmission and reception from the local control unit, proceed as follows:

  Turn on the local control unit.

  Set and hold the TEL-REMOTE-RADIO switch to RADIO.

  Press the handset switch to transmit; release it to receive.

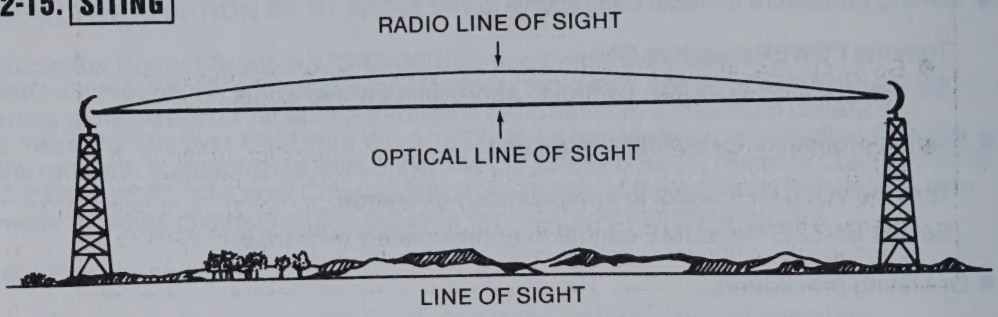
- Stopping procedure.

  Turn the POWER switch on the local unit to OFF.

  Turn the VOLUME switch on the remote control unit to OFF.

Section III. FIELD OPERATIONS, USUAL CONDITIONS

2-15. SITING

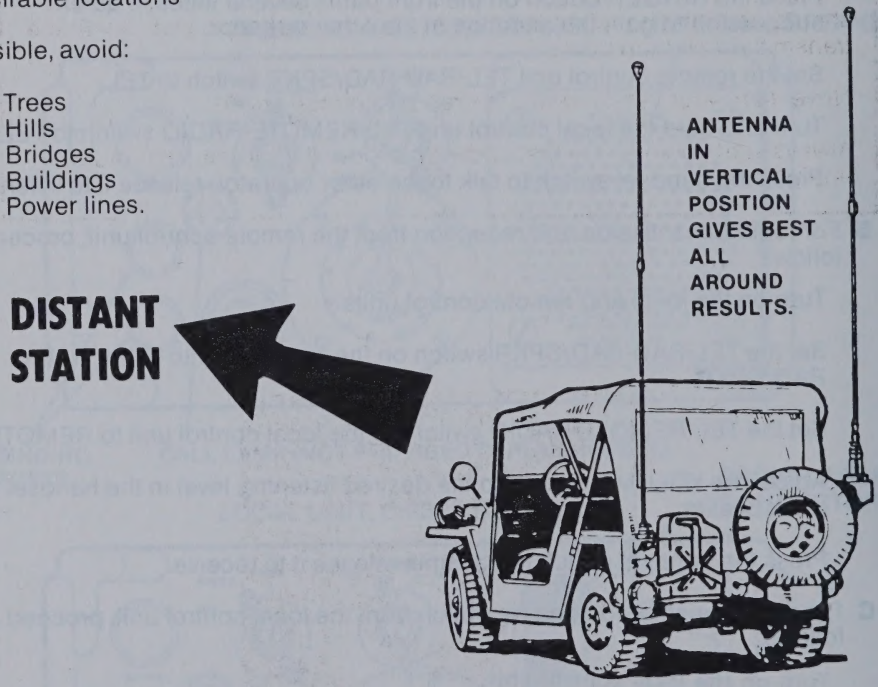


The radio waves emitted by your radio tend to travel to the distant station on a straight line as shown above. In other words, very high frequency (VHF) transmissions are line of sight transmissions.

Undesirable locations

If possible, avoid:

- Trees
- Hills
- Bridges
- Buildings
- Power lines.



Desirable locations and positions

- The higher up you are, the better the odds for long range communications.
- The position of your vehicle or antenna may affect your range.

Try positioning your vehicle so it's pointing towards the distant station. This may improve communications.

2-15. SITING – Continued

WARNING

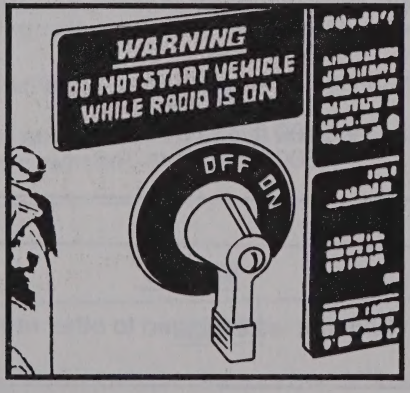
- Be aware that as you move to higher ground or try to position your vehicle, you may be making yourself more visible to the enemy.
- High voltage can be encountered when a communication antenna of a vehicle strikes a power line. Death to persons inside, or in contact with, the vehicle can result. To reduce this hazard, do not stand closer than 0.5 meter (20 inches) from antenna when the unit is transmitting. High levels of electromagnetic radiation exist in this area.

CAUTION

If possible, operate your radio with engine running. The engine speed should be high enough to indicate the battery is charging while you are transmitting on high power.

Never start your vehicle while the radio or radios are ON.

Always start your vehicle first and then proceed to operate the radio equipment.



2-16. AUTHORIZED OPERATING FREQUENCIES

Your authorized frequencies and call signs are found in the Communications Electronics Operation Instructions (CEOI).

but

Carefully check all authorized frequencies and make sure the following Cautions are followed.

CAUTION

Do not use the following frequencies because they cause improper operation of the set: – 33.90 MHz – 45.20 MHz – 56.50 MHz – 67.80 MHz.

CAUTION

Do not use frequencies which are separated exactly by 5.75 MHz or 23.00 MHz.

CAUTION

Do not operate too close to other radio sets. The following chart specifies the minimum distance your antenna must be from another antenna while operating at different frequency separations.

Minimum frequency separation required	Minimum antenna distance separation (whip antenna or RC-292)	
	Between AN/VRC-12 Series Radio on HIGH power	Between AN/VRC-12 Series Radio on LOW power
10 MHz	5 ft./1.5 m.	5 ft./1.5 m.
7 MHz	60 ft./18.3 m.	10 ft./3.0 m.
4 MHz	150 ft./45.7 m.	50 ft./15.2 m.
2 MHz	400 ft./121.9 m.	200 ft./61.0 m.
1 MHz	800 ft./243.8 m.	350 ft./106.7 m.

CAUTION

Do not transmit on frequencies assigned to other radio sets or commercial stations.

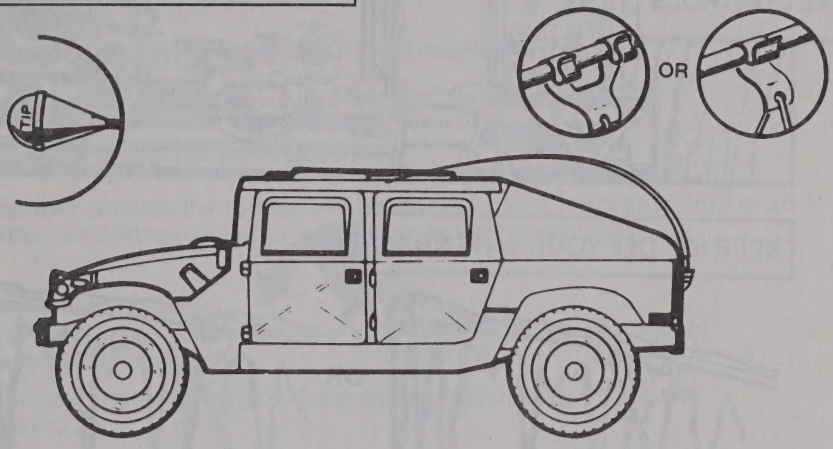
and

If you have problems with interference, check with C-E ORG MAINT and have them check their Interfering Frequencies Charts to make sure you are using an interference-free frequency.

2-17. RADIOTELEPHONE PROCEDURES

Communication procedures are designed to expedite the transmission of messages and reduce the number of errors made by providing a precise and uniform method of handling radio traffic under all operating conditions. As a radio operator it is imperative that you know proper procedures, practice proper procedures, and correct improper procedures. Refer to FM 21-2 (Soldier's Manual) or APC-125(D) for proper Radiotelephone Procedures.

2-18. PREPARATION FOR MOVEMENT



Routine movement normally requires that the antennas be tied down.

WARNING

- Make sure the antenna tie-down clamp is properly installed.
- Make sure the tie-down ropes are connected to a safe place. If you are not sure what a safe place is, check with your supervisor.
- Make sure no antenna extends beyond the sides of the vehicle.
- Make sure that an antenna tip cap is securely taped on each antenna's upper element.

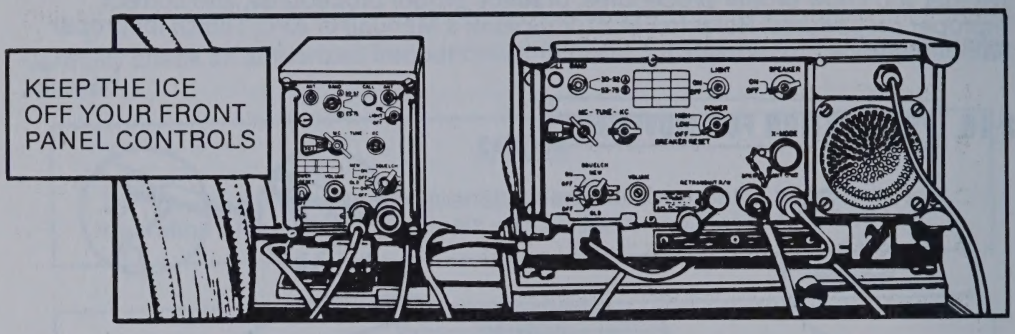
CAUTION

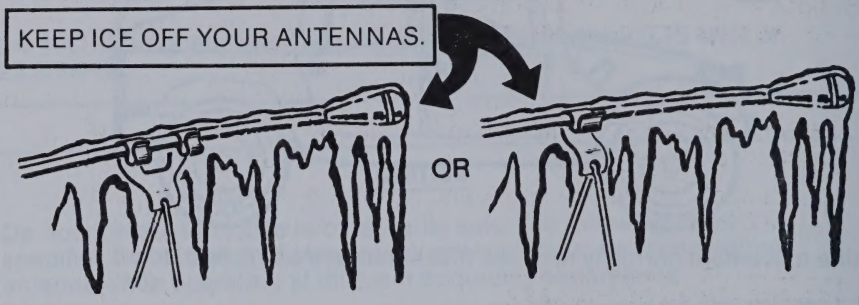
- Before starting the vehicle, make sure the radios are turned off.
- Make sure antennas do not cross each other.

Section IV. FIELD OPERATIONS, UNUSUAL CONDITIONS

2-19. OPERATION AT LOW TEMPERATURES

Keep radio front panel controls free of ice.





- Do not bend your cables and cords suddenly.
- If possible, keep radio equipment on. If not possible, warm up both the RT and aux receivers before operation.
- Make sure that the vehicle charging system can maintain a satisfactory battery charging rate.

2-20. OPERATION IN DESERT AND DUSTY AREAS

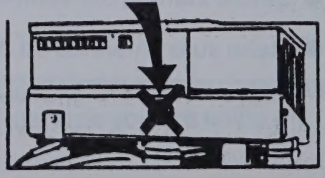
Keep equipment area as dust-free as possible.

If your radio equipment is constantly exposed to the sun, it should be protected with a heat reflecting paint. Request this service from your supporting maintenance group.

Watch the water level in the vehicle battery. Keep it at the proper level.

and - under all conditions

Make sure the RT blower port area is free for proper airflow.



2-21. OPERATION IN A NUCLEAR–BIOLOGICAL–CHEMICAL (NBC) ENVIRONMENT

In a nuclear environment, extremely high voltages (over a million volts) are produced by electromagnetic pulse (EMP).

If informed by your supervisor to protect your AN/VRC-12 Series Radios from pending electromagnetic pulse, do the following:

A Turn off all power.

B Disconnect audio accessories.

C Disconnect all antennas from RT(s) and receivers.

D Disconnect any remote control units (e.g., AN/GRA-39).

E Disconnect power cables, if possible.

F If possible, remove the radios and receivers from mounts and store in an armored personnel carrier or tank or cover with plastic material.

NOTE

- For complete information refer to DA Pam 50-3 "The Effects of Nuclear Weapons."
- For decontamination of C-E equipment, refer to TB 700-4 and TM 3-220.

2-22. EMERGENCY PROCEDURES

NOTE

Report any emergency situations to your supervisor as soon as possible.

- RT ANTENNA BROKEN OR INOPERATIVE

If vehicle is not to be moved, use a long wire antenna.
You may use the aux receiver antenna, but this may reduce distance.

NOTE

If you are not moving and you have a broken or unusable whip antenna, a piece of field wire or other insulated wire can be used to make up a temporary antenna.
Suggestions: Ask your supervisor to get you a copy of Training Circular, TC-11-5 (Know How to Repair and Fabricate Antennas).

- HEAT PROBLEMS–THE RT BLOWER KEEPS RUNNING WHEN THE RT IS NOT KEYED AND THE RT CASE IS WARMER THAN NORMAL.

One way to help reduce the heat generated by the RT is to keep the transmitting time to a minimum.

CAUTION

If possible, use this emergency procedure only if your RT has been checked out during the past 3 months by C-E ORG MAINTENANCE for proper RT output and proper matching of the RT to its antenna.

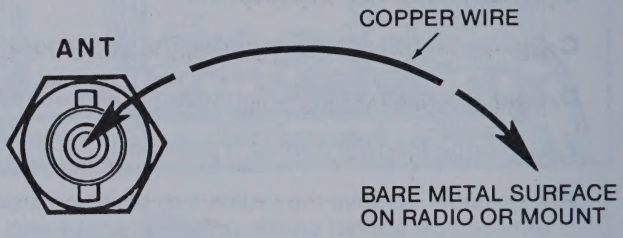
2-23. JAMMING

Recognition and identification of jamming.

- A common jamming procedure is the transmission of a strong or annoying signal on your frequency making it difficult or impossible for you to maintain communications.
- Sometimes this signal may be from a friendly station.
- Unusual noise or interference may be from an outside source or your receiver may not be working right.

Check out your receiver.

- Disconnect the antenna.
- Short out your antenna jack to the radio chassis.



WARNING

When you know that you are being jammed, notify your superior as soon as possible.

and

If the noise or interference continues you have a bad receiver, call C-E ORG MAINT.

If it stops, report condition to your supervisor.

2-24. ANTIJAMMING PROCEDURES

WARNING

Make sure any antijamming action you take does not make you an easy target for the enemy. Be careful.

- Try to get rid of the effects of the jamming signal by repositioning your vehicle.
- Try to use a nearby obstruction as a screen. Place your vehicle so that the obstruction acts as a screen between you and the possible interfering transmitter site.
- You may get rid of the jamming by pointing your vehicle towards the distant station you are communicating with. Try several vehicle positions.
- Change the setting of your VOLUME control. This may enable you to raise the level of the desired signal enough to be distinguished from the jamming signal.

  Ask the station you are communicating with to switch to HI power if it is on LO power.
- If you cannot maintain communications after trying all possible procedures, get permission to change to another frequency.

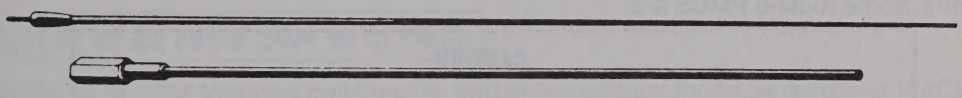
CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. LUBRICATING INSTRUCTIONS

3-1. SILICONE COMPOUND

Use silicone compound MIL-S-8660C (appendix D, item 2).

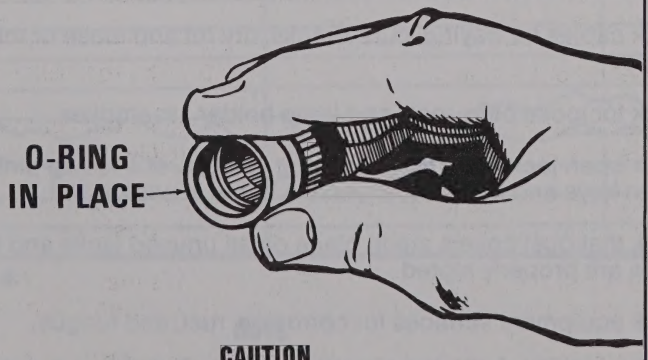
- Use on antenna sections.
- Clean threads before you apply the silicone compound.
- Put on male threads only.



CAUTION

- Do not use graphite grease on the threads.
- Operator shall not remove RT antenna's lower element from the MX unit. This is a function of C-E ORG MAINT. Operator may remove and replace the upper element only.

- Use on O-rings and accessory connectors (small amount with care).



CAUTION

Make sure no silicone compound gets on the contacts or pins of any jack.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICE

3-2. GENERAL

Preventive Maintenance Checks and Services (PMCS) are done to:

A Spot small problems and correct them before they can affect your mission.

B Keep the radio set functioning properly and in good physical condition.

WARNING

Extreme electrical hazards exist that will cause DEATH or SERIOUS INJURY. Remember, you are not authorized to open up any radio components to make adjustments and/or repairs.

Some operator PMCS are routine while others are scheduled.

Routine PMCS are things that you should do any time you see that they need to be done. Some routine PMCS are:

CAUTION

Clean with a rag dampened with clear water only. Do not use water under pressure or any solvent (e.g., paint thinner, gasoline, trichlorotrifluoroethane, etc). Damage to equipment will result.

A Clean and dust the equipment.

B Check cable for proper connections and for tightness. If a connection cannot be tightened, report the defect to C-E ORG MAINT.

NOTE

Defects observed when doing the remaining routine checks should be reported to C-E ORG MAINT for corrective action.

C Check for improper plug orientation (position) and routing of cables.

D Check cables for fraying, cuts, cracks, dry rot and loose or missing hold-down clamps.

E Check for loose plug, jack, and lamp holder assemblies.

F Check open jacks and plugs for bent, broken, or missing pins and for worn or broken keys and keyways, anytime a cable is unplugged.

G Check that dust covers are in place on all unused jacks and that all unused cables are properly stored.

H Check equipment surfaces for corrosion, rust, and fungus.

I Check controls of all components to ensure that they are not loose, broken or missing and that the controls turn or set properly.

3-2. GENERAL – Continued

Scheduled PMCS are things that you must do at specified times to make sure that your equipment is operationally ready. As scheduled PMCS is done, associated routine PMCS should also be done. Scheduled PMCS, and when to do them, are listed in table 3-1. The normal time intervals are:

BEFORE OPERATION. Do your B- (before) PMCS to make sure that your equipment is ready to operate.

AFTER OPERATION. Do your A- (after) PMCS to make sure that your equipment will be ready to operate the next time.

CAUTION

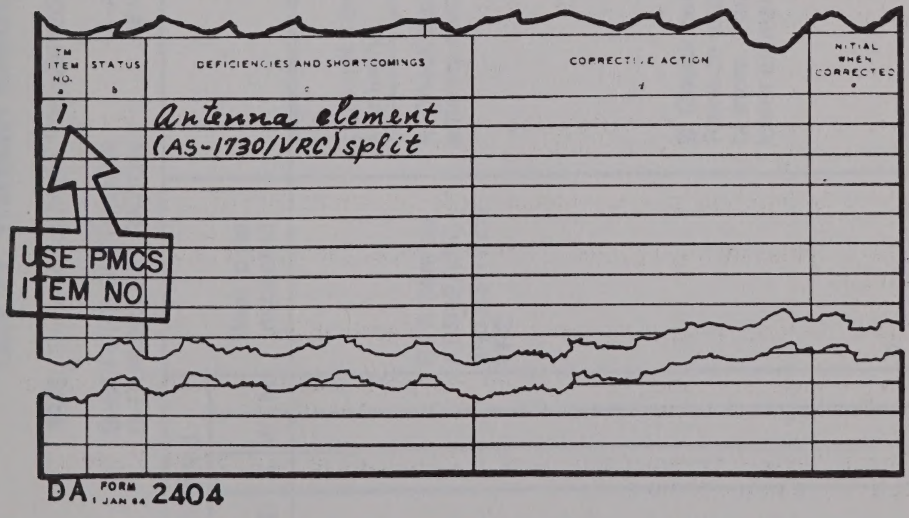
Be alert for unusual noises and odors during operation.

3-3. USE OF DA FORM 2404 WITH PMCS

Use DA Form 2404 to report deficiencies and shortcomings found, while doing PMCS.

NOTE

Use the PMCS Item No. of table 3-1 for the TM ITEM NO. of column a on DA Form 2404 (Equipment Inspection and Maintenance Worksheet).



NOTE

The heading and other columns on DA Form 2404 should be filled out according to the instructions in DA Pam 738-750 (Maintenance Management Update) and the special instructions from your commander.

Table 3-1. Preventive Maintenance Checks and Service

NOTE

As a minimum, the ● (dot) in the Interval column indicates when a check and/or service must be done as follows:

B–BEFORE OPERATION
D–DURING OPERATION
A–AFTER OPERATION
W–WEEKLY
M–MONTHLY.

- The numbers in the Item No. column indicate the order the checks and services are to be done and are referred to when recording deficiencies and shortcomings on DA Form 2404.

CAUTION

Do not set RT on its rear panel. Damage to the exhaust blower will result.

- Before starting the B-checks, turn all POWER switches OFF and then remove the radio components (RT's and R-442's) from their mounts and set aside.

Table 3-1. Preventive Maintenance Checks and Service – Continued

NOTE: The checks in the "Interval" column are to be performed in the order listed.

B–BEFORE OPERATION **A**–AFTER OPERATION **M**–MONTHLY
D–DURING OPERATION **W**–WEEKLY

Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
1	●					RT Antennas AT-912/VRC and AS-1729/VRC	**WARNING** Do not transmit on the radio while handling the antenna. **A** Check that tip cap is installed on top of upper antenna element and is securely taped in place. **B** Check both antenna elements for damage. Replace upper element if broken or split by 6 inches or more. Upper element must be tightly screwed into lower element.	Any element that has more than a 6 inch split or upper element is shorter than 58 inches or threads are stripped.

Table 3-1. Preventive Maintenance Checks and Service – Continued

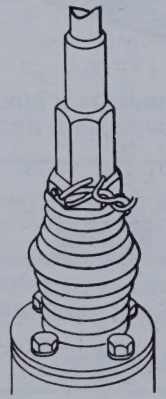
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
1 (cont.)	●					RT Antennas AT-912/VRC and AS-1729/VRC	**C** Check lower antenna element connection to matching unit support spring. Red O-ring, on top of support spring, must not be visible. Lower element collar must be safety-wired to support spring. When not properly installed, notify C-E ORG MAINT. 	Red O-ring on top of support spring can be seen.
						AS-1729/VRC	**D** Check matching unit: MX-6707: Check that four mounting bolts with nuts and star washers are correctly installed through steel reinforcing ring and tight. Check matching unit housing for cracks, holes or softening, due to improper painting, cleaning or tightening.	Housing has cracks, holes or soft spots.

Table 3-1. Preventive Maintenance Checks and Service – Continued

Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
1 (cont.)	●					AT-912/VRC	MX-2799: Check installation of Antenna Support Base AB-719 and mounting of MX-2799. AB-719 must be tightly clamped into its mounting clamp (two bolts, four lock washers, and two nuts); the mounting clamp must be tightly bolted to MX-2799 (four bolts with lock washers), and oriented for vertical polarization of antenna elements. AB-719's RF cable must be properly connected to MX-2799's antenna jack (not kinked or pinched). MX-2799 must be tightly bolted to its support bracket (six bolts with lock washers).	AB-719's RF cable is badly kinked or broken.
						AS-1729/VRC	**E** Check that matching unit ground strap is serviceable (not broken or badly frayed) and correctly installed (one end to matching unit ground stud with two star washers and other end bolted to mounting bracket with a bolt, three star washers, and a nut).	

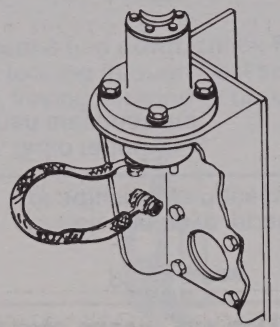


Table 3-1. Preventive Maintenance Checks and Service – Continued

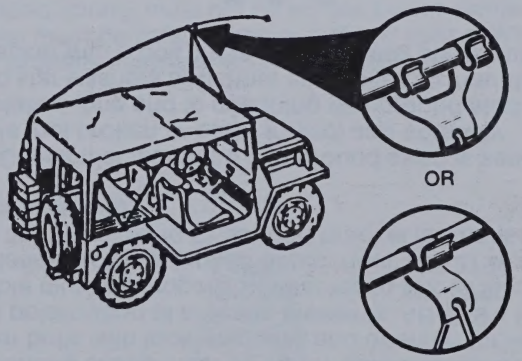
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
1 (cont.)	●						Remember, radio range is reduced when antennas are tied down.  	
						AT-912/VRC and AS-1729/VRC	**F** Check that all mounting brackets are serviceable (no cracks, etc) and that all bolts, lock washers and nuts are properly installed and tight.	
						AT-912/VRC and AS-1729/VRC	**G** Check that tie-down clamp and rope are serviceable and properly positioned.	

Table 3-1. Preventive Maintenance Checks and Service – Continued

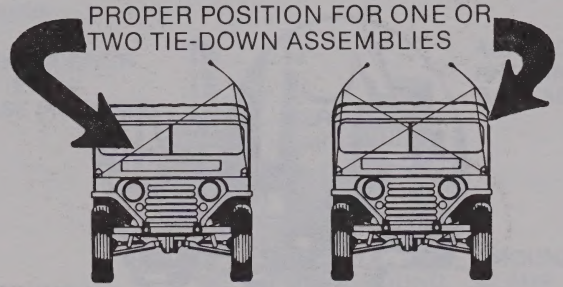
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
1 (cont.)	●					Because these radio sets are used with many different vehicles this manual cannot give you a standard place to tie the tie-down ropes. Your organization should have a SOP covering specific tie-down procedures.	**CAUTION** When pulling antenna down, make sure that tip is above any person and that it will not swing beyond the side of the vehicle.	
							PROPER POSITION FOR ONE OR TWO TIE-DOWN ASSEMBLIES 	
						WARNING Ensure antenna element does not strike a power line.	**H** With antenna tied down, check RF lead in spring support by looking through bent spring. Look for cuts, kinks, fraying, missing or broken lead.	RF lead badly damaged or broken.
						NOTE To prevent damage or weakening of antenna support spring, release tie-downs when vehicle is parked in a storage area (e.g., motor pool).		

Table 3-1. Preventive Maintenance Checks and Service – Continued

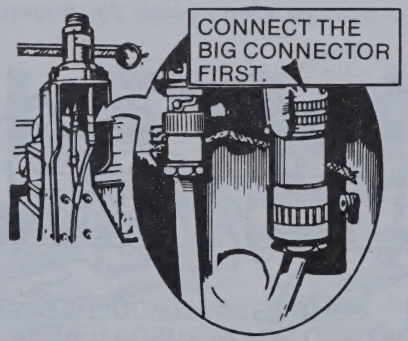
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
1 (cont.)	●						**I** Check that Control Cable CX-4722 and then RF Cable CG-1773 are properly connected to matching unit.  	The RF cable (small plug) cannot be connected to the matching unit.
2	●					Aux receiver antenna (if authorized)	**A** Check that the tip cap is installed on the top of the Upper Antenna Element (MS-118A) and securely taped in place. (See note.) **WARNING** If Antenna Element AT-1095 is used, instead of elements MS-116A, MS-117A and MS-118A, tip cap and tie-down assembly are used.	
							B Check antenna elements for damaged elements. Elements must be tightly screwed together and into the support base.	Elements are cracked, broken or cannot be tightly screwed together.

Table 3-1. Preventive Maintenance Checks and Service – Continued

Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
2 (cont.)	●						**C** Check support base for damage, tightness, and proper ground strap installation. AB-15 Ground Strap has its large ring between the bottom insulator and the mounting bracket, while for AB-558, one end is attached to mounting bracket by a bolt, three star washers, and a nut. For both bases, other end of ground strap is attached to a clamp around UG-273 Adapter.	
							D Check that all mounting brackets are serviceable (no cracks, etc) and that all bolts, lockwashers and nuts are properly installed and tight.	
							E Check that tie-down clamp and rope are serviceable and properly positioned.	
							F Check that RF Cable CG-1773 is properly connected to support base. (Adapter UG-273 must be present. Optional Adapter UG-306 may also be used.)	RF cable cannot be connected to the antenna base.

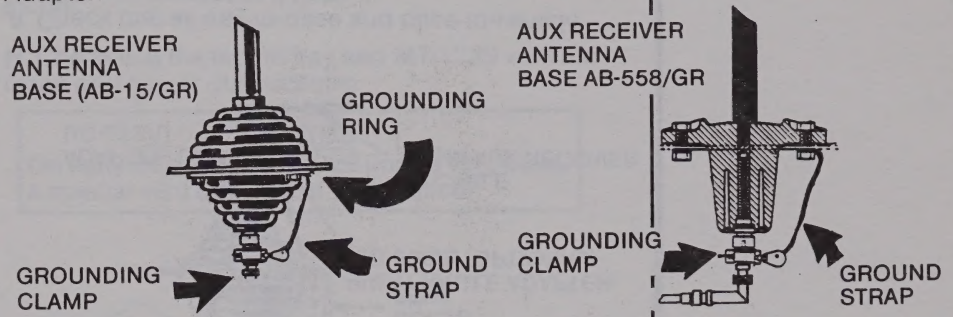


Table 3-1. Preventive Maintenance Checks and Service – Continued

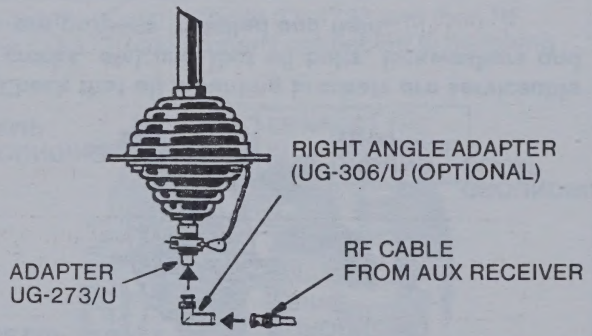
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
2 (cont.)	●							
3	●					Radio Mounts MT-1029 and MT-1898	**A** Check that all tray-to-base and base-to-vehicle mounts are present and tight. **B** Check that the J-box cover is in place and tightly screwed to J-box (six screws and lock washers). **C** Check that all connecting cable plugs are properly oriented and connected and that cables are correctly routed. **D** Check that all ground straps are present, serviceable (not badly frayed or broken), and tightly fastened. (MT-1029 manufactured before 1973 have two ground straps; all other mounts have one ground strap.)	

Table 3-1. Preventive Maintenance Checks and Service – Continued

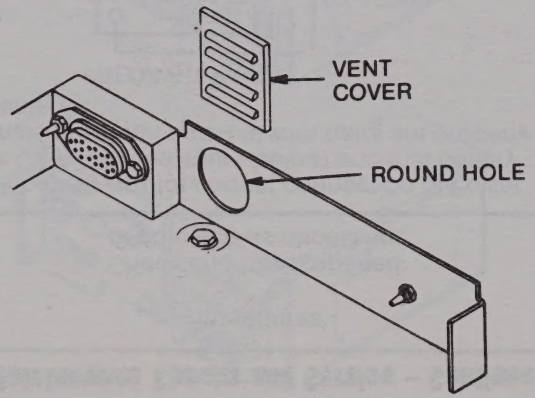
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
3 (cont.)	●						**E** Check that guide pins are not bent or missing. **F** Check that front clamp assemblies are complete and serviceable. **G** Check that J14/J24 dust cover(s) is present, serviceable and anchored by a screw to the side of the mount. **H** Check that the mount tray and MT-1029 vent are clean and free of obstructions. **CAUTION** On early models of MT-1029 (round vent hole), a special vent cover must be installed.  	

Table 3-1. Preventive Maintenance Checks and Service – Continued

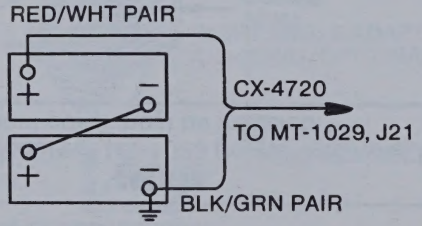
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
4	●					CX-4720 and battery box	Check battery box for correct connection of Power Cable CX-4720 (see figure below) and that battery terminals are clean and that wire pairs are properly connected.  	Power cable is badly damaged or any of its leads are broken.
5	●					RT's	Check RT's as follows: **A** Remove dust cover from MT-1029 J24 and place out of way. **B** Check that all RT control knobs are present, tight and operate smoothly. **C** Check that RT lamp holder assemblies and jacks are tight in chassis. **D** Turn RT POWER switch OFF. **E** Place RT flat on mount tray and push into mount. **F** Secure RT in mount with the clamp assemblies.	RT cannot be secured in mount with clamp assemblies.

Table 3-1. Preventive Maintenance Checks and Service – Continued

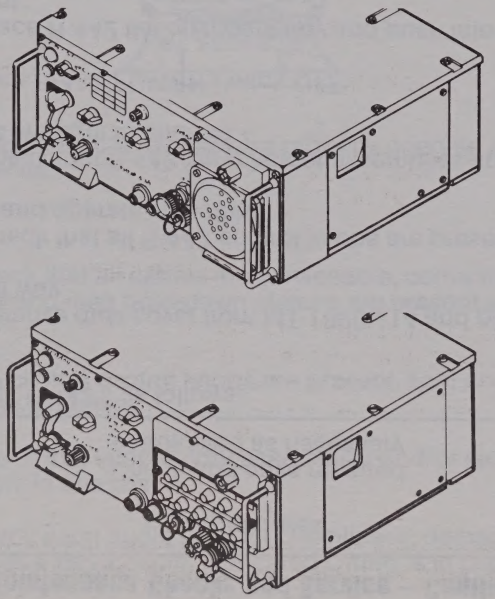
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
5 (cont.)	●						**G** Connect Control Cable CX-4722 to RT ANT CONT jack and RF Cable CG-1773 to RT ANT jack. **H** For RT-246, connect Control Cable CX-7059 to REMOTE jack, if authorized. **I** Secure dust covers on all unused RT jacks. 	RF Cable CG-1773 cannot be secured to RT ANT jack.

Table 3-1. Preventive Maintenance Checks and Service – Continued

Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
6	●					R-442's, if authorized	Check R-442's as follows: **A** Remove dust cover from MT-1898 J14 and place out of way. **B** Check that all R-442 control knobs are present, tight and operate smoothly. **C** Check that R-442 lamp holder assemblies and jacks are tight in chassis. **D** Turn R-442 POWER switch OFF. **E** Place R-442 flat on mount tray and push into mount. **F** Secure R-442 in mount with the clamp assembly. **G** Connect RF Cable CX-1773 to R-442 ANT jack. (For second R-442, connect RF Cable CG-1127 between first R-442's open ANT jack and an ANT jack on second R-442). **H** Secure dust covers on all R-442 unused jacks.	R-442 cannot be secured in mount with clamp assembly. RF Cable CG-1773 or CG-1127 cannot be secured to R-442 ANT jack.

Table 3-1. Preventive Maintenance Checks and Service – Continued

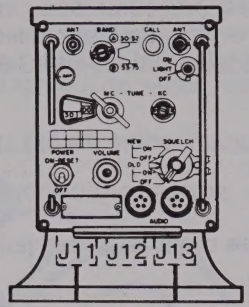
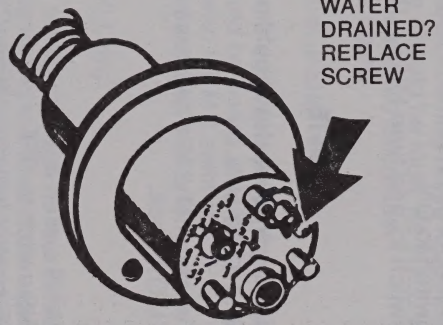
Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
								
7	●					Control Boxes C-2299 and C-2742, if authorized.	**A** Check that cable plugs are properly oriented and connected.	
							B Check that all cables are serviceable, correctly routed and their hold-down clamps are present and tight.	Cracks, cuts or damaged cables.
							C Check that control knobs are present, tight and operate smoothly.	
							D Check that lamp holder assemblies and/or jacks are tight in chassis.	
8	●					Audio accessories.	**A** Check each audio plug for cleanliness, damage and that a serviceable, lubricated O-ring is in place.	

Table 3-1. Preventive Maintenance Checks and Service – Continued

Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
8 (cont.)	●						**B** Check that moisture barriers (if used) are in place and not damaged.	
							C For each audio plug, check its assigned audio jack for cleanliness and damage, then connect plug making sure that it locks into place on jack.	During operation check, RT or R-442 does not produce rushing noise, RT will not key or keys continuously, RT has no transmit sidetone, or radio set cannot make contact during communication check.
9	●					Radio Set	Do an operational check for radio set. See paragraph 3-4.	
10			●			Radio Set	Do following shutdown procedures:	
							A Check that RT blower stops running (RT unkeyed).	RT blower does not stop running.
							B Check that all radio components stop operating when POWER switches are OFF.	Radio component does not stop operating.
							C If operation was under extremely dusty conditions, notify C-E ORG MAINT.	

Table 3-1. Preventive Maintenance Checks and Service – Continued

Item No.	Interval B	D	A	W	M	Item to be Inspected	Procedures Check and have repaired or adjusted as necessary	For Readiness Reporting Equipment is Not Ready/Available If:
10 (cont.)	●						**D** If operation was under unusually damp conditions or vehicle was washed, remove drain screw from Matching Unit MX-6707. If water drains out, notify C-E ORG MAINT; if no water, replace drain screw.  DRAIN ALL WATER TRAPPED INSIDE THE MOUNT **E** Properly store all items that are not left installed.	Water runs out of MX-6707 with drain screw removed.

3-4. OPERATIONAL CHECK

Operator's PMCS Equipment Performance Checklist for Nonsecured AN/VRC-12 Series Radio Sets

A Prepare your radio set for an operational evaluation.

1. Preset the following controls.

   a. All RT's

      (1) Turn POWER switch to OFF
      (2) Turn SPEAKER switch to ON (RT-524 only)
      (3) Turn SQUELCH switch to OLD OFF
      (4) Turn VOLUME control fully counterclockwise (CCW), no volume
      (5) Turn LIGHT switch to ON
      (6) Turn BAND switch to, and tune MC – TUNE – KC controls for, an off-net frequency.

NOTE

The following frequencies should not be used: 33.90, 45.20, 56.50, and 67.80 MHz.

      (7) When the RT's is/are RT-246's and have C-2742's, unplug CX-7059's from RT's REMOTE jack.

   b. C-2299 (if any)

      (1) Turn RAD TRANS switch to 1
      (2) Turn RETRANS switch to OFF
      (3) Turn VOLUME control fully clockwise (CW), maximum volume.

   c. All R-442's (if any)

      (1) Set POWER switch at OFF
      (2) Turn SQUELCH switch to OLD OFF
      (3) Turn VOLUME control fully counterclockwise (CCW), no volume
      (4) Turn LIGHT switch to ON
      (5) Turn BAND switch to, and tune MC – TUNE – KC controls for, an off-net frequency that is in a band that is opposite of the RT (a (6) above).

2. Inspect the radio set installation. Using the appropriate figure of chapter 2, section 1 verify the proper placement of major components on their mounts and ensure that they are properly cabled together. (See paragraph 2-7.)

NOTE

For symptom identified by (*), radio set is not operational ready for PMCS (table 3-1).

B Do these checks for all RT's. (When Radio Set is AN/VRC-45 or -49, first do these checks for the A-RT and then, as directed later, do them again for the C-RT.)

3-4. OPERATIONAL CHECK – Continued

1. Power Input

   a. Turn RT POWER to LOW. (Allow 5 minutes warm-up.)
   b. RT dial lamp should light.

NOTE

Matching unit switching sound might be heard.

2. Audio Output

   a. Turn RT VOLUME control fully clockwise (CW); then counterclockwise (CCW) to midpoint.
   b. In earphone and speaker, rushing noise loudness should increase. At full volume, rushing noise should be loud. As VOLUME control is turned CCW, rushing noise loudness should decrease.
      *If no rushing noise is heard.

3. Matching unit (MX) Control (initial)

   a. Turn RT BAND switch to another setting, then return to original setting.
   b. Switching sound should be heard at MX. (For MX-6707 setting of range switch should agree with RT MC setting.)
      *If no switching sound and MX is at wrong range and cannot be manually set.

4. Squelch Control and Call Lamp

   a. Rotate RT SQUELCH switch through all four positions.
   b. OFF position: Loud rushing noise should be heard.
   c. ON position: Rushing noise should be quieted (eliminated).
   d. CALL lamp: Should remain off for all positions.

5. Keying

   a. Setup:

      (1) Return RT SQUELCH switch to an OFF position (OLD OFF or NEW OFF).
      (2) RT POWER switch should be at LOW.

CAUTION

Do not key RT when antenna is disconnected. When keyed, if blower does not run, do not keep RT keyed for more than three seconds.

   b. Key RT. (Press/release PTT switch several times.)

      (1) When PTT is pressed, RT should key. (Relays should click, blower should run, rushing noise should drastically reduce.)
      (2) When PTT is released, RT should unkey. (Relays should again click, rushing noise should return, blower should stop running within three minutes.)
      *If no RT keying or RT stays keyed.

3-4. OPERATIONAL CHECK – Continued

6. Muting

   a. With RT speaker on (VOLUME at midpoint) again key RT.
   b. With mike at about 10 inches from speaker, there should be no audio feedback (squeal).

7. 150 Hz Sidetone and Modulation

   a. Setup: RT POWER switch should be at LOW.
   b. Key RT; then turn RT SQUELCH switch through all four positions. Listen to earphone.
   c. 150 Hz should be heard in earphone for all SQUELCH positions except OLD ON. (Adjust RT VOLUME, as required.)

8. Voice Sidetone and Modulation

   a. Key RT and initiate a radio check.
   b. Voice sidetone should be heard in earphone. (Adjust RT VOLUME, as required.)
      *If no voice sidetone.

NOTE

How to proceed: When the RT being checked is an:
- RT-246, go to step **C.**
- RT-524, but radio set is:
  - –AN/VRC-46, -47, or -48 with C-2299, go to step **E**
  - –AN/VRC-47, or -48 without C-2299, go step **F**
  - –AN/VRC-49, and C-RT has not been checked, go to step **F**; but, if C-RT has been checked, go to step **E**
  - –AN/VRC-46 without C-2299, go to step **I.**

C Do this check for all RT-246's. When Radio Set is AN/VRC-45, first do this check for the A-RT-246 and then, as directed later, do it again for the C-RT-246.

1. Automatic Tune

NOTE

Instructions for presetting RT-246 push buttons are on closed-side of push button's hinged cover.

   a. At random, select ten frequencies and then preset frequency 1 on push button 1 , frequency 2 on push button 2 ; etc, until all ten are preset.
   b. The preset frequency should appear in RT dial frequency window as presetting is accomplished. MX switching sound should be heard.
   c. **In descending order, press each push button, but allow each tuning cycle** to complete before pressing another push button.
   d. RT MC – TUNE – KC controls and BAND switch (as appropriate) should change to preset frequency. MX switching sound should be heard.

3-4. OPERATIONAL CHECK – Continued

NOTE

How to proceed: When RT-246 being checked has:
- C-2742's, go to step **D**
- No C-2742, but radio set is:
  - –AN/VRC-12, -43, or -44 with C-2299, go to step **E**
  - –AN/VRC-12, or -44 without C-2299, go to step **F**
  - –AN/VRC-45, and C-RT has not been checked, go to step **F**; but, if C-RT has been checked, go to step **E**
  - –AN/VRC-43 without C-2299, go to step **I**.

D Do these checks for all RT-246's that have C-2742's. When Radio Set is AN/VRC-45, first, do these checks for the A-RT-246, and then, as directed later, do them again for the C-RT-246.

When two C-2742's are in tandem, first check the one directly connected to RT-246 (primary C-2742).

1. Remote Power Control

   a. Setup:

      (1) Press-in RT-246 push button 1 (allow tuning cycle to complete)
      (2) Turn all RT POWER switches OFF
      (3) Replug all CX-7059 cables to appropriate RT REMOTE jack
      (4) Unlock all C-2742 knob latches
      (5) Turn all C-2742 CHAN SEL switches to channel 1 (lower left write-in space)
      (6) Turn all C-2742 PWR SW's (power switches) to OFF.

   b. Turn RT POWER switch to REMOTE.
   c. RT should remain off.
   d. Turn C-2742 PWR SW to LO, then press back and release C-2742 SW (toggle switch).
   e. RT dial lamp; C-2742 CONTROL lamp, should light. (Power might come on without pressing SW.)
   f. Turn C-2742 PWR SW to HI, then to LO several times.
   g. At RT, RT's high/low power relay should click each time C-2742 PWR SW is changed.

2. Remote Frequency Selection

   a. In turn, but allow each tuning cycle to complete, turn C-2742 CHAN SEL switch through all its positions (ten).
   b. RT MC – TUNE – KC controls; BAND switch (as appropriate) should change according to the ten preset frequencies.

NOTE

When C-2742's are in tandem, repeat step 1 and then step 2 for second C-2742. (Primary C-2742 PWR SW must remain at LO or HI.) Afterwards go to step 3, below.

3-4. OPERATIONAL CHECK – Continued

3. Remote Power Control Shutdown

   a. Turn RT's primary C-2742 PWR SW to OFF. RT should stop operating.
   b. Turn RT POWER switch to LOW. RT dial lamp should light.

NOTE

How to proceed: When radio set being checked is:
- AN/VRC-12, -43, or -44 with C-2299, go to step **E**
- AN/VRC-12, or -44 without C-2299, go to step **F**
- AN/VRC-45 and C-RT has not been checked, go to step **F**; but, if C-RT has been checked, go to step **E**
- AN/VRC-43 without C-2299, go to step **I**.

E Do these checks for all radio sets that have C-2299.

1. A-RT Audio Output

   a. Setup:

      (1) C-2299 should be preset according to paragraph **A** 1b.
      (2) Turn all RT speakers OFF.
      (3) Turn all RT SQUELCH switches to NEW ON.
      (4) All RT POWER switches should be at LOW.
      (5) Connect RT's audio accessory(ies) to C-2299 audio jack(s).

   b. Turn A-RT's SQUELCH switch to NEW OFF; then vary RT VOLUME control setting. Return RT VOLUME control to midpoint.
   c. As heard in C-2299 earphone, loudness of rushing noise should vary IAW RT VOLUME setting.
   d. Vary C-2299 VOLUME control setting. Return to fully CW position (full volume).
   e. As heard in C-2299 earphone, loudness of rushing noise should vary IAW C-2299 VOLUME setting.

2. A-RT Keying

   a. Key A-RT. (Press/release PTT switch of audio accessory connected to C-2299, several times.)
   b. When PTT is pressed, A-RT should key. (Relays should click, A-RT blower should run, rushing noise should be drastically reduced.) When PTT is released, A-RT should unkey. Relays should again click, rushing noise should return, A-RT blower should stop running within three minutes.

3. A-RT Modulation

   a. Key A-RT; initiate a radio check.
   b. Voice sidetone should be heard in earphone connected to C-2299.

NOTE

How to proceed: When radio set being checked is:
- AN/VRC-12, -44, -47, or -48, go to step **F**.
- AN/VRC-45 or -49 (both RT's checked), proceed to steps 4 through 7, below.
- AN/VRC-43 or -46, go to step **I**.

3-4. OPERATIONAL CHECK – Continued

4. C-RT Audio Output

   a. Setup:

      (1) Turn A-RT SQUELCH switch to NEW ON.
      (2) Turn C-2299 RAD TRANS switch to 2.

   b. Turn C-RT SQUELCH switch to NEW OFF, then vary RT VOLUME control setting. Return RT VOLUME control to midpoint.
   c. As heard in C-2299 earphone, loudness of rushing noise should vary IAW **RT VOLUME setting.**
   d. Vary C-2299 VOLUME control setting. Return to fully CW position (full volume).
   e. As heard in C-2299 earphone, loudness of rushing noise should vary IAW C-2299 VOLUME setting.

5. C-RT Keying

   a. Key C-RT. (Press/release PTT switch of audio accessory connected to C-2299, several times.)
   b. When PTT is pressed, C-RT should key. (Relays should click C-RT blower should run, rushing noise should be drastically reduced.) When PTT is released, C-RT should unkey. Relays should again click, rushing noise should return, C-RT blower should stop running within three minutes.

6. C-RT Modulation

   a. Key C-RT, initiate a radio check.
   b. Voice sidetone should be heard.

7. Relay (Retransmission)

NOTE

*If mission requires relay, not operationally ready if symptoms are observed for this step.

   a. Setup:

      (1) Turn both RT SQUELCH switches to OLD ON.
      (2) Both RT POWER switches should be at LOW.
      (3) Turn one RT to a B-band frequency and other RT to a A-band frequency.

CAUTION

Ensure that antennas are connected to RT's.

   b. Turn C-2299 RETRANS switch to ON. Both RT's should remain unchanged.
   c. Unplug A-RT's X-MODE plug. A-RT's CALL lamp should light and C-RT should key.
   d. Replug A-RT's X-MODE plug. A-RT's CALL lamp should go off and C-RT should unkey.

3-4. OPERATIONAL CHECK – Continued

e. Unplug C-RT RT's X-MODE plug. C-RT's CALL lamp should light and A-RT should key.
f. Replug C-RT's X-MODE plug. C-RT's CALL lamp should go off and A-RT should unkey.

F Do this check for all radio sets that have two or more radio components.

1. Remote Power Control

a. Turn A-RT POWER switch OFF. A-RT dial lamp should go off.
b. Turn additional radio component(s) POWER switch(es) ON. Additional radio component(s) dial lamp(s) should not light.

NOTE

If for b (above) the additional radio component(s) dial lamp lgihts, the link, of the additional component's mount, is probably in "direct".

c. Turn A-RT POWER switch to LOW. Additional radio components dial lamp(s) should light.

NOTE

How to proceed: When radio set being checked is:
- AN/VRC-45 or -49, check C-RT starting with step **B**.
- AN/VRC-12, -44, -47, or -48 go to step **G**.

G Do these checks for all radio sets that have R-442's. When Radio Set is AN/VRC-44 or -48, first do these checks for B-R-442 and then, as directed later, do them again for C-R-442.

1. R-442 Audio Output

a. Turn R-442 VOLUME control fully clockwise (CW), then counterclockwise (CCW) to midpoint.
b. In earphone and speaker, rushing noise loudness should increase, at full volume, rushing noise should be loud, as VOLUME control is turned CCW, rushing noise loudness should decrease.
*If no rushing noise is heard.

2. SQUELCH Control and CALL Lamp

a. Rotate R-442 SQUELCH switch through all four positions.
b. OFF position: Loud rushing noise should be heard.
c. ON position: Rushing noise should be quieted (mostly eliminated).
d. CALL lamp: Should remain off for all positions.

NOTE

How to proceed: When radio set being checked is:
- AN/VRC-44, -48, repeat steps **G** 1 and 2 for C receiver; afterwards, go to step **H**.
- AN/VRC-12, -47, go to step **I**.

3-4. OPERATIONAL CHECK – Continued

H Do this check for all radio sets that have R-442's.

1. Receiver Speaker Muting

   a. Setup:

      (1) Tune all R-442's to a B-band frequency.
      (2) Turn all R-442 SQUELCH switches OFF. (Verify rushing noise of all R-442's.)
      (3) Turn all R-442 VOLUME controls, from off, one-quarter turn clockwise.
      (4) Connect a speaker to an AUDIO jack of each R-442.
      (5) Tune RT to a A-band frequency.
      (6) RT's POWER switch should be at LOW.

   b. Key RT. (Press/release PTT switch several times.)
   c. When RT is keyed, rushing noise from R-442 speaker(s) should be greatly reduced.
   d. When RT is unkeyed, rushing noise from R-442 speaker(s) should return to preset level.

I Do this check for all AN/VRC-12 Series Radio Sets.

1. Distant Check

   a. Setup: Place radio set in its operational environment.
   b. Establish communication with another radio set (station) located a prescribed (planned) distance away.
   c. The distant radio set's (station) operator should respond.
      *If communications are not established.

J Operation of Radio Set during mission.

1. Setup: Tune radio components to their assigned frequencies IAW OP Order.
   *If matching unit does not switch to proper range and cannot be manually set.
2. Perform mission.

K Shut down of radio set after mission.

1. Setup: Tune radio components to 30.00 MHz.
2. Do the procedures of PMCS, item no. 10.

Section III. TROUBLESHOOTING PROCEDURES

3-5. TROUBLESHOOTING

The troubleshooting chart tells you some of the troubles you may encounter during the operation of the radio sets when they are used without intercom equipment. You should perform the tests, inspections, and corrective actions in the order listed.

This manual cannot cover all the troubles that may occur, nor all tests or inspections and corrective actions. If a trouble is not listed or it cannot be corrected by doing the corrective actions, notify your supervisor.

NOTE

- Before you try troubleshooting, check with C-E ORG MAINT to make sure that:

  A The links in all radios are properly set.

  B The X-MODE-NORMAL switch inside all radios is properly set.

  C Radio equipment is properly connected to the battery charging system.

  D Vehicle battery charging system is working OK.

- The following troubleshooting procedures apply to troubleshooting the radio equipment only, without any VINSON equipment connected to the radios

  with

  the X-MODE plug snugly screwed on the RT X-MODE jack.

Table 3-2. Troubleshooting Chart
RT-524(*)/VRC
RT-246(*)/VRC
R-442(*)/VRC

NOTE

Before doing any corrective action(s), make sure all preparatory steps and all control presets have been done.

EPC step No.(s)	Symptom(s)	Probable cause(s)	Corrective action(s)
1 2 3	Dial lamp does not light. Rushing noise is in RT's speaker and earphone. Switching sound is heard in matching unit.	RT's dial lamp burned out.	Report this to the C-E ORG MAINT.
1 2 3	No dial light. No rushing noise in speaker and earphone. No matching unit switching sound.	1 RT unit. 2 MT-1029. 3 CX-4720 cable. 4 Vehicle batteries.	Remove and reseat RT in its mount. If problem still present, report this to the C-E ORG MAINT.
1 2 3	Dial lamp lights, and RT's blower motor is running. Rushing noise not heard. Matching unit switching sound heard.	1 Audio accessories. 2 RT. 3 MT-1029. 4 CX-4723. 5 C-2299.	Unplug all external audio accessories, one at a time. (e.g., H-189, M-80, LS-454; etc). If blower motor stops running, when an audio accessory is removed, replace that item. If problem still present, report this to the C-E ORG MAINT.
1 2 3	Dial lamp lights. No rushing noise in audio reproducer(s). Switching sound heard in matching unit.	1 Audio reproducer(s). 2 RT. 3 MT-1029. 4 CX-4723. 5 C-2299.	Remove and clean RT's jack(s) and audio plug pins, with a pencil eraser. If problem still present, report this to the C-E ORG MAINT.

Table 3-2. Troubleshooting Chart – Continued

EPC step No.(s)	Symptom(s)	Probable cause(s)	Corrective action(s)
1 2 3	Dial lamp lights. Rushing noise is heard in speaker, but not heard in headset/handset. Switching sound heard in matching unit.	1 Headset/handset. 2 RT. 3 MT-1029. 4 CX-4723. 5 C-2299.	Remove and clean RT's jack(s) and headset/handset plug pins, with a pencil eraser. If problem still present, report this to the C-E ORG MAINT.
1 2 3	Dial lamp lights. Rushing noise heard. No switching sound in matching unit.	1 RT. 2 CX-4722. 3 Matching unit.	1 Turn RT POWER switch OFF and RESET to LOW or HIGH position. 2 Check for proper cabling of CX-4722 Cable. If problem still present, report this to the C-E ORG MAINT.
4	Rushing noise heard in one or both squelch on positions and call lamp lights in one or both on positions.	RT.	Report this to the C-E ORG MAINT.
5	No RT keying.	1 Microphone/handset. 2 RT.	Remove microphone/handset and with a pencil eraser, clean RT's retrans jacks pins and microphone/handset's plug pins. If problem still present, report this to the C-E ORG MAINT.
6	No speaker muting.	RT.	Report this to the C-E ORG MAINT.
7	No 150 Hz sidetone.	RT.	Report this to the C-E ORG MAINT.
8	No voice sidetone.	1 Handset. 2 RT.	Remove handset and with a pencil eraser, clean RT's retrans jack pins and handset plug pins. If problem still present, report this to the C-E ORG MAINT.

Table 3-2. Troubleshooting Chart – Continued

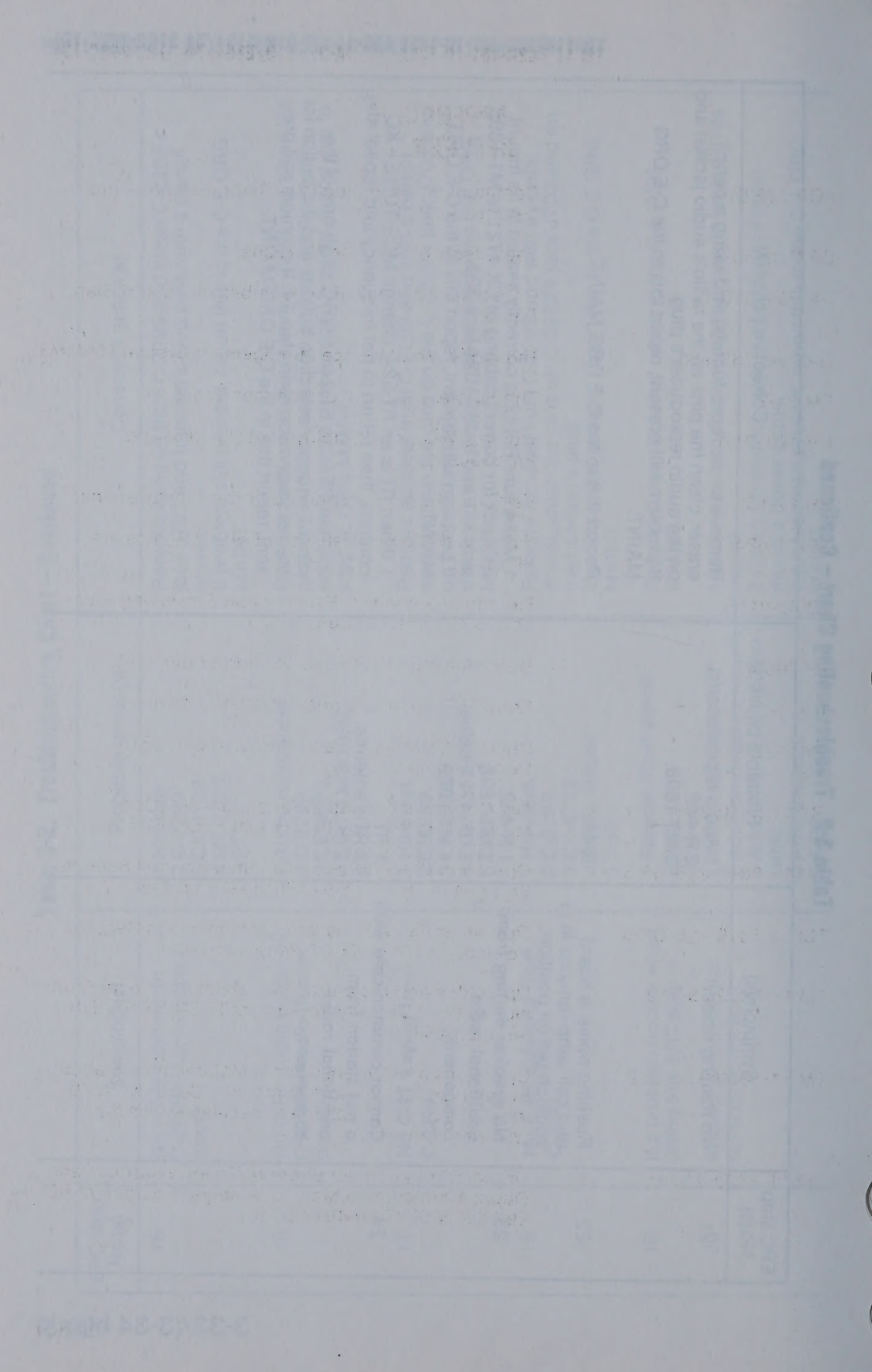
EPC step No.(s)	Symptom(s)	Probable cause(s)	Corrective action(s)
9	No automatic tuning. or No matching unit switching.	RT. 1 RT. 2 CX-4722. 3 Matching unit.	Report this to the C-E ORG MAINT. or Check CX-4722 for correct cabling. If problem still present, report this to the C-E ORG MAINT.
10	No remote power control from C-2742.	1 C-2742. 2 CX-7059. 3 RT.	Check for correct cabling of the CX-7059 Cable to the RT's remote jack and to jack J71 on the C-2742. If problem still present, report this to the C-E ORG MAINT.
11	No RT remote frequency selection from C-2742.	1 C-2742. 2 CX-7059. 3 RT.	Check for correct cabling of the CX-7059 cable to RT's remote jack and to the C-2742's jack J71. If problem still present, report this to the C-E ORG MAINT.
12	No RT remote power shutdown from C-2742.	1 C-2742. 2 CX-7059. 3 RT. 4 MT-1029.	1 Disconnect CX-7059 from C-2742 jack J71. 2 Disconnect CX-7059 from RT's remote power control jack. If problem still present, report this to the C-E ORG MAINT.
13	No A-RT audio output at C-2299's Audio Reproducer.	1 Audio reproducer. 2 C-2299. 3 CX-4723. 4 MT-1029. 5 RT.	Remove audio reproducer from C-2299 and clean jack J704 and audio reproducer's plug pins using a pencil eraser. If problem still present, report this to the C-E ORG MAINT.
14	No RT keying from C-2299.	1 Microphone/handset. 2 C-2299. 3 CX-4723. 4 MT-1029. 5 RT.	1 Remove microphone/handset from C-2299's jack J703, and clean the pins on J703 and on the microphone/handset's plug. 2 Check for correct cabling of CX-4723 to C-2299 and MT-1029. If problem still present, report this to the C-E ORG MAINT.

Table 3-2. Troubleshooting Chart – Continued

EPC step No.(s)	Symptom(s)	Probable cause(s)	Corrective action(s)
15	No voice sidetone in C-2299's Audio Reproducer.	1 Handset. 2 C-2299. 3 CX-4723. 4 MT-1029. 5 RT.	Remove handset from C-2299 and clean C-2299's jack J703 and handset's plug pins, with a pencil eraser. If problem still present, report this to the C-E ORG MAINT.
16	No C-RT audio output in C-2299's Audio Reproducer.	1 Audio reproducer. 2 C-2299. 3 CX-4723. 4 C-RT's MT-1029. 5 C-RT.	Remove audio reproducer from C-2299 and clean the pins on C-2299's jack J704 and on the audio reproducer's plug. If problem still present, report this to the C-E ORG MAINT.
17	No C-RT keying from C-2299.	1 Handset. 2 C-2299. 3 CX-4723. 4 C-RT's mount. 5 C-RT.	Remove handset from C-2299 and with a pencil eraser, clean the pins on the C-2299's jack J703 and on the handset's plug. If problem still present, report this to the C-E ORG MAINT.
18	No C-RT sidetone from C-2299.	1 Handset. 2 C-2299. 3 CX-4723. 4 C-RT's mount. 5 C-RT.	Remove handset from C-2299 and with a pencil eraser, clean the pins on C-2299's jack J703 and on the handset's plug. If problem still present, report this to the C-E ORG MAINT.
19	If a problem occurs when doing this EPC step —	1 Remote input power circuit.	Report all problems that occur to the C-E ORG MAINT.
20	Additional radio's dial lamp does not light.	1 Additional radio. 2 Additional radio's mount. 3 Additional radio's power cable. 4 A-RT's mount. 5 A-RT.	1 Make sure additional radio is properly seated in its mount. 2 Check for correct cabling of additional radio mount's power cable. If problem still present, report this to the C-E ORG MAINT.

Table 3-2. Troubleshooting Chart – Continued

EPC step No.(s)	Symptom(s)	Probable cause(s)	Corrective action(s)
21	No rushing noise.	1 Audio reproducer(s). 2 R-442. 3 MT-1898.	Remove audio reproducer(s) and using a pencil eraser, clean the pins on the radio's audio jack(s) and on the audio reproducer's plug. If problem still present, report this to the C-E ORG MAINT.
22	Rushing noise is heard and call lamp remains lit in squelch old on position.	R-442.	Report this to the C-E ORG MAINT.
23	**No speaker muting from additional radio component.**	1 R-442. 2 MT-1898. 3 CX-4721 cable. 4 MT-1029. 5 RT.	1 Make sure R-442 is correctly seated in its mount. 2 Check for correct cabling of CX-4721 to MT-1898 jack J11 and to MT-1024 jack J23. If problem still present, report this to the C-E ORG MAINT.
24	**Cannot communicate with a net station from additional radio component.**	1 RT. 2 RT's antenna. 3 CG-1773. 4 Siting.	1 When RT is an RT-524, change MC – TUNE – KC controls, then return to net frequency and repeat step 24. 2 When RT is an RT-246(*)/VRC, push one of the other frequency selection buttons and the button for the net frequency, redo step 24. If problem still present, report this to the C-E ORG MAINT.



APPENDIX A
REFERENCES

ACP 125(D)	Communication Instructions Radiotelephone Procedures ACP 125(D).
DA Pam 50-3	The Effects of Nuclear Weapons.
DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
DA Pam 738-750	The Army Maintenance Management System (TAMMS).
FM 21-2	The Soldier's Manual of Common Tasks.
FM 101-31-1	Nuclear Weapons Employment Doctrine and Procedures.
SB 11-131	Vehicular Radio Sets and Authorized Installations.
SB 11-624	Warning Notice for Vehicles in which Radios are Mounted.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment.
TB 700-4	Decontamination of Facilities and Equipment.
TC-11-5	Know How to Repair and Fabricate Antennas.
TM 3-220	Chemical, Biological and Radiological (CBR) Decontamination.
TM 11-5810-256-OP-1	Net Controller Operating Procedures for Communications Security Equipment TSEC/KY-57.
TM 11-5810-256-OP-3	Operating Procedures for Communications Security Equipment TSEC/KY-57 Wheeled Vehicles.
TM 11-5810-256-OP-5	Operating Procedures for Communication Security Equipment TSEC/KY-57 Retransmission.
TM 11-5810-256-12	Operator's and Organizational Maintenance for Communications Security Equipment TSEC/KY-57. (NSN 5810-00-434-3644)
TM 11-5810-312-12-2	Operator's and Organizational Maintenance Manual Installation Kits for Communication Security Equipment TSEC/KY-57 Volume 2 Installation Kits for Wheeled Vehicles.
TM 11-5820-348-15	Organizational, Direct Support, General Support, and Depot Maintenance Manual: Antenna Equipment RC-292 (NSN 5985-00-497-8554).

APPENDIX A – Continued

TM 11-5820-401-10-1-HR	Hand Receipt Technical Manual Covering End Item/ Components of End Item (COEI). Basic Issue Items and Additional Authorization List (AAL) for AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used Without Intercom Systems).
TM 11-5820-401-10-2-HR	Hand Receipt Technical Manual Covering End Item/ Components of End Item (COEI). Basic Issue Items and Additional Authorization List (AAL) for AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437) (Used With Intercom Systems).
TM 11-5820-401-20-1	Organizational Maintenance for Radio Sets: AN/VRC-12 (NSN 5820-00-223-7412), AN/VRC-43 (NSN 5820-00-223-7415), AN/VRC-44 (NSN 5820-00-223-7417), AN/VRC-45 (NSN 5820-00-223-7418), AN/VRC-46 (NSN 5820-00-223-7433), AN/VRC-47 (NSN 5820-00-223-7434), AN/VRC-48 (NSN 5820-00-223-7435), AN/VRC-49 (NSN 5820-00-223-7437) (Used Without Intercom Set).
TM 11-5820-477-12	Operator's and Organizational Maintenance Manual Radio Set Control Groups AN/GRA-39 (NSN 5820-00-889-3860) AN/GRA-39A (NSN 5820-00-082-3998) and AN/GRA-39B (NSN 5820-00-949-9909).
TM 11-5820-862-13&P	Operator, Organizational and Direct Support, Maintenance Manual for Interconnecting Box J-3714/G (NSN 5820-01-034-6404).
TM 11-5965-262-13	Organizational and Direct Support Maintenance Manual (Including Repair Parts and Special Tools Lists): Headset-Microphone H-161/U and H-161A/U (FSN 5965-082-4037 and 5965-824-4871).
TM 11-5965-280-15	Operator's, Organizational, and Direct Support, Maintenance Manual Including Repair Parts and Special Tools List: Headset H-189/GR (NSN 5965-00-069-8886).

APPENDIX A – Continued

TM 11-5985-262-14	Operator, Organizational, DS, GS, Maintenance Manual: Including Repair Parts and Special Tools Lists: AS-1729/VRC (NSN 5985-00-985-9024).
TM 11-5985-355-13	Operator's, Organizational, and Direct Support Maintenance Manual Antenna AS-2731/GRC (NSN 5985-01-017-0785).
TM 11-5985-357-13	Operator's, Organizational and Direct Support Maintenance Manual for Antenna Group OE-254/GRC (NSN 5985-01-063-1574).
TM 11-5995-202-15	Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual for Transmission Cable Kits, MK-456/GRC and MK-456A/GRC (NSN 5993-00-973-1544).
TM 750-244-2	Procedures for Destruction of Electronics Material to Prevent Enemy Use (Electronics Command).

APPENDIX B
COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1. SCOPE

This appendix lists integral components of Radio Sets AN/VRC-12 and AN/VRC-43 through AN/VRC-49 to help you inventory items required for safe and efficient operation.

B-2. GENERAL

The Components of End Item List is divided into the following sections.

a. Section II. Integral Components of the End Item. These items, when assembled, comprise Radio Sets AN/VRC-12 and AN/VRC-43 through AN/VRC-49 and must accompany them whenever they are transferred or turned in. The illustration will help you identify these items.

b. Section III. Basic Issue Items. Not applicable.

B-3. EXPLANATION OF COLUMNS

a. Illustration. This column is divided as follows:

(1) Figure number. Indicates the figure number of the illustration on which the item is shown.

(2) Item number. The number used to identify item called out in the illustration.

b. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.

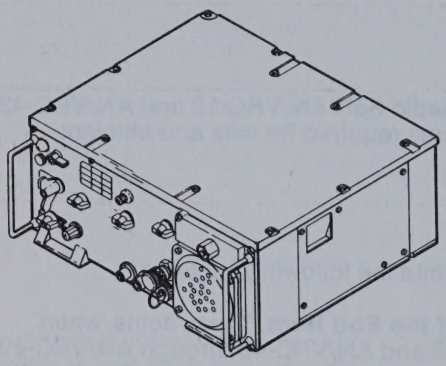
c. Description. Indicates the Federal item name and, if required a minimum description to identify the item. The part number indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. Following the part number, the Federal Supply Code for Manufacturers (FSCM) is shown in parentheses.

d. Location. If the physical location is necessary to help you inventory each major item, it will be listed in this column.

e. Usable on Code. Not applicable.

f. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

g. Quantity. This column is left blank for use during an inventory. Under the Rcvd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item.



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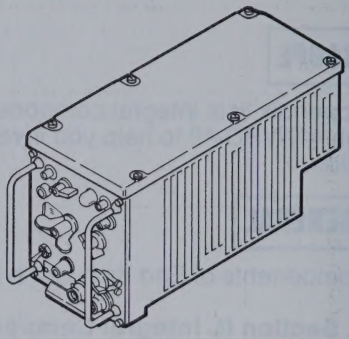

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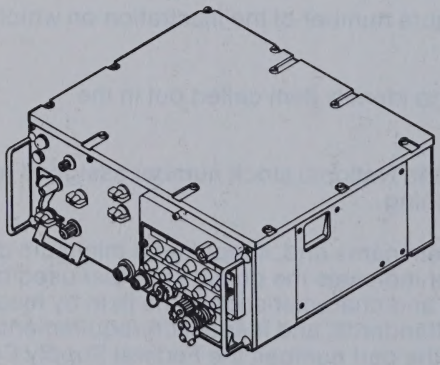

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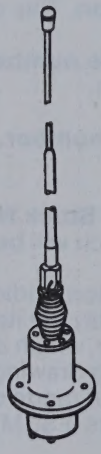

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FIGURE B-1

SECTION II INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	(3) DESCRIPTION (FSCM)	(4) LOCATION	(5) USABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
		5820-00-223-7412	RADIO SET AN/VRC-12						
B-1	1	5820-00-892-0623	RECEIVER-TRANSMITTER, RADIO						
			RT-246/VRC OR	(80063)			1		
		5820-01-140-9071	RT-246A/VRC	(80058)					
B-1	3	5820-00-892-0624	RECEIVER-RADIO						
			R-442/VRC OR	(80063)			1		
		5890-01-140-9070	R-442A/VRC	(80058)					
B-1	4	5985-00-985-9024	ANTENNA AS-1729/VRC	(80063)			1		
		5820-00-223-7415	RADIO SET AN/VRC-43						
B-1	1	5920-00-892-0623	RECEIVER-TRANSMITTER, RADIO						
			RT-246/VRC OR	(80063)			1		
		5820-01-140-9070	RT-246A/VRC	(80058)					
B-1	4	5985-00-985-9024	ANTENNA AS-1729/VRC	(80063)			1		
		5820-00-223-7417	RADIO SET AN/VRC-44						
B-1	1	5820-00-592-0623	RECEIVER-TRANSMITTER, RADIO						
			RT-246/VRC OR	(80063)			1		
		5820-01-140-9071	RT-246A/VRC	(80058)					
B-1	3	5820-00-892-0624	RECEIVER, RADIO						
			R-442/VRC OR	(80063)			2		
		5820-01-140-9070	R442A/VRC	(80058)					
B-1	4	5985-00-985-9024	ANTENNA AS-1729/VRC	(80063)			1		

SECTION II INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	(3) DESCRIPTION (FSCM)	(4) LOCATION	(5) USABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
		5820-00-223-7418	RADIO SET AN/VRC-45						
B-1	1	5820-00-892-0623	RECEIVER-TRANSMITTER, RADIO						
			RT-246/VRC OR	(80063)			2		
		5820-01-140-9071	RT-246A/VRC	(80058)					
B-1	4	5985-00-985-9024	ANTENNA AS-1729/VRC	(80063)			2		
		5820-00-223-7433	RADIO SET AN/VRC-46						
B-1	2	5820-00-892-0622	RECEIVER-TRANSMITTER, RADIO						
			RT-524/VRC OR	(80063)			1		
			RT-524A/VRC						
B-1	4	5985-00-985-9024	ANTENNA AS-1729/VRC	(80063)			1		
		5820-00-223-7434	RADIO SET AN/VRC-47						
B-1	2	5820-00-892-0622	RECEIVER-TRANSMITTER, RADIO						
			RT-524/VRC OR	(80063)			1		
			RT-524A/VRC						
B-1	3	5820-00-892-0624	RECEIVER, RADIO						
			R-442/VRC OR	(80063)			1		
		5820-01-140-9070	R-442A/VRC	(80058)					
B-1	4	5985-00-985-9024	ANTENNA AS-1729/VRC	(80063)					
		5820-00-223-7435	RADIO SET AN/VRC-48						

SECTION II INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	(3) DESCRIPTION (FSCM)	(4) LOCATION	(5) USABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
B-1	2	5820-00-892-0622	RECEIVER-TRANSMITTER, RADIO RT-524/VRC OR RT-524A/VRC	(80063)			1		
B-1	3	5820-00-892-0624 5820-01-140-9070	RECEIVER, RADIO R-442/VRC OR R-442A/VRC	(80063) (80058)			2		
B-1	4	5895-00-985-9024	ANTENNA AS-1729/VRC	(80063)			1		
		5820-00-223-7437	RADIO SET AN/VRC-49						
B-1	2	5820-00-892-0622	RECEIVER-TRANSMITTER, RADIO RT-524/VRC OR RT-524A/VRC	(80063)			2		
B-1	4	5985-00-985-9024	ANTENNA AS-1729/VRC	(80063)			2		

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists additional items you are authorized for support of the Radio Sets AN/VRC-12 and AN/VRC-43 through AN/VRC-49.

C-2. GENERAL

This list identifies items that have to accompany the Radio Sets AN/VRC-12 and AN/VRC-43 through AN/VRC-49 and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

C-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorizes the item(s) to you.

NOTE

To order individual components normally contained in installation kits, refer to SB 11-131.

SECTION II ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM	USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN M151, A1 & A2			
	AN/VRC-12:			
5820-00-450-6793	MK-1221/VRC-12 INSTALLATION KIT			1
	AN/VRC-43:			
5820-00-450-6792	MK-1220/VRC-43 INSTALLATION KIT			1
	AN/VRC-44:			
5820-00-469-6685	MK-1241/VRC-44 INSTALLATION KIT			1
	AN/VRC-46:			
5820-00-450-6804	MK-1234/GRC INSTALLATION KIT			1
	AN/VRC-47:			
5820-00-193-8348	MK-1306/VRC-47 INSTALLATION KIT			1
	AN/VRC-48:			
5820-00-479-3034	MK-1225/VRC-48 INSTALLATION KIT			1
	AN/VRC-49:			
5820-00-450-6795	MK-1224/VRC-49 INSTALLATION KIT			1

SECTION II ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM / USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN M151AC W/106MM RIFLE		
	AN/VRC-46:		
5820-00-450-6799	MK-1229/GRC INSTALLATION KIT		1
	AN/VRC-47:		
5820-00-450-6798	MK-1228/VRC-47 INSTALLATION KIT		1
	RADIO SET USED IN M151, A1 W/XENON AN/GSS-14		
	AN/VRC-46:		
5820-00-351-3019	MK-1402/GRC INSTALLATION KIT		1
	RADIO SET USED IN M715		
	AN/VRC-12:		
5820-00-469-6683	MK-1239/VRC-12 INSTALLATION KIT		1
	AN/VRC-43:		
5820-00-450-6794	MK-1222/VRC-43 INSTALLATION KIT		1
	AN/VRC-46:		
5820-00-469-6687	MK-1243/GRC INSTALLATION KIT		1

SECTION II ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN M715 – (CONTINUED)		
	AN/VRC-47:		
5820-00-450-6796	MK-1226/VRC-47 INSTALLATION KIT		1
5820-00-450-6797	AN/VRC-49:		
	MK-1227/VRC-47 INSTALLATION KIT		1
	RADIO SET USED IN M715		
	W/AN/VRC-34/AN/GRC-87		
5820-00-469-0683	AN/VRC-12:		
	MK-1239/VRC-12 INSTALLATION KIT		1
5820-00-401-9709	AN/VRC-12:		
	MK-1476/GRC INSTALLATION-ACCESSORY KIT		1
	RADIO SET USED IN M561 (CAB)		
5820-00-469-6689	AN/VRC-12:		
	MK-1245/VRC-12 INSTALLATION KIT		1
5830-00-481-3695	AN/VRC-12:		
	MK-1255/VIC-1(V) INSTALLATION KIT		1

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM	USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN M561 (CAB) - (CONTINUED)			
5820-00-493-7526	AN/VRC-46:			
	MK-1252/GRC INSTALLATION KIT			1
5820-00-469-6689	AN/VRC-47:			
	MK-1245/VRC-47 INSTALLATION KIT			1
5830-00-481-3695	AN/VRC-47:			
	MK-1255/VIC-1(V) INSTALLATION KIT			1
	RADIO SET USED IN M561 OR M792 (AMBUL) (TRAILER)			
5820-00-469-6690	AN/VRC-46:			1
	MK-1246/GRC INSTALLATION KIT			
5820-00-493-7530	AN/VRC-47:			1
	MK-1253/VRC-47 INSTALLATION KIT			
5830-00-481-3696	AN/VRC-47:			1
	MK-1256/VIC-1(V) INSTALLATION KIT			

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM	USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SETS USED IN M1009			
5820-01-175-7412	AN/VRC-12:			
	MK-2415/VRC INSTALLATION KIT			1
5820-01-175-2109	AN/VRC-43:			
	MK-2416/VRC INSTALLATION KIT			1
5820-01-175-2110	AN/VRC-44:			
	MK-2417/VRC INSTALLATION KIT			1
5820-01-175-2105	AN/VRC-46:			
	MK-2418/VRC INSTALLATION KIT			1
5820-01-175-2106	AN/VRC-47:			
	MK-2419/VRC INSTALLATION KIT			1
	AN/VRC-48:			
5820-01-175-2111	MK-2420 INSTALLATION KIT			1
	AN/VRC-49:			
5820-01-175-2107	MK-2421 INSTALLATION KIT			1

SECTION II ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM	USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN M561			
	AN/VRC-49:			
5820-00-493-7531	MK-1254/VRC-49 INSTALLATION KIT			1
	RADIO SET USED IN M34, M35, A1, A2, M135 & M211			
	AN/VRC-12:			
5820-00-469-6686	MK-1242/VRC-12 INSTALLATION KIT			1
	AN/VRC-47:			
5820-00-459-8586	MK-1223/VRC-47 INSTALLATION KIT			1
	RADIO SET USED IN CAB OF M34, M35, A1, A2, M135 & M211			
	AN/VRC-46:			
5820-00-469-6688	MK-1244/VRC-46 INSTALLATION KIT			1
	RADIO SET USED IN TRUCK OF M34, M35, A1, A2, M135 & M211			
	AN/VRC-46:			
5820-00-469-6684	MK-1240/GRC INSTALLATION KIT			1

SECTION II ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM	USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN M37, M37B1			
	AN/VRC-12:			
5820-00-469-6691	MK-1247/VRC-12 INSTALLATION KIT			1
	AN/VRC-46:			
5820-00-450-6802	MK-1232/GRC INSTALLATION KIT			1
	AN/VRC-49:			
5820-00-450-6800	MK-1230/VRC-49 INSTALLATION KIT			1
	RADIO SET USED IN M37, M37B			
	AN/VRC-43:			
5820-00-450-6801	MK-1231/VRC-43 INSTALLATION KIT			1
	AN/VRC-47:			
5820-00-450-6803	MK-1247/VRC-47 INSTALLATION KIT			1
	RADIO SET USED IN M51, A1, A2			
	AN/VRC-46:			
5820-00-569-9570	MK-1738/GRC INSTALLATION KIT			1

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM / USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN M342A2		
	AN/VRC-46:		
5820-00-569-9570	MK-1738/GRC INSTALLATION KIT		1
	RADIO SET USED IN GENERAL PURPOSE INSTALLATION		
	AN/VRC-12:		
5820-00-401-9699	MK-1439/VRC-12 INSTALLATION KIT		1
	AN/VRC-43:		
5820-00-461-9666	MK-1446/VRC-43 INSTALLATION KIT		1
	AN/VRC-44:		
5820-00-401-9672	MK-1440/VRC-44 INSTALLATION KIT		1
	AN/VRC-45:		
5820-00-401-9668	MK-1444/VRC-45 INSTALLATION KIT		1
	AN/VRC-46:		
5820-00-401-9669	MK-1443/VRC-46 INSTALLATION KIT		1
	AN/VRC-47:		
5820-00-401-9667	MK-1445/VRC-47 INSTALLATION KIT		1

SECTION II ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SET USED IN GENERAL PURPOSE INSTALLATION - (CONTINUED)		
	AN/VRC-48:		
5820-00-401-9670	MK-1442/VRC-48 INSTALLATION KIT		1
	AN/VRC-49:		
5820-00-401-9700	MK-1438/VRC-49 INSTALLATION KIT		1
	RADIO SETS USED IN M882/M892 SERIES		
	AN/VRC-12:		
5820-01-022-6293	MK-1814/VRC-12		1
	AN/VRC-43:		
5820-01-022-3332	MK-1811/VRC-43		1
	AN/VRC-46 (W/AN/VRC-64/160):		
5820-01-022-3328	MK-1817/GRC		
	RADIO SETS USED IN M882/M892 SERIES		
	AN/VRC-46 (W/REMOTE IN DASH):		
5820-01-048-0761	MK-1869/GRC		1

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
	RADIO SETS USED IN M882/M892 SERIES - (CONTINUED)		
5820-01-022-3333	AN/VRC-47:		
	MK-1810/VRC-47		1
5820-01-049-1018	AN/VRC-47 (W/REMOTE IN DASH):		
	MK-1870/VRC-47		1
5820-01-022-3330	AN/VRC-49:		
	MK-1813/VRC-49		1
	RADIO SETS USED IN M818/M819		
	AN/VRC-46:		
	MK-1910/VRC-46		1

APPENDIX D
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the Radio Sets AN/VRC-12 and AN/VRC-43 through AN/VRC-49. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS

a. Column 1 - Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, apppendix D").

b. Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item.

C – Operator/Crew

O – Organizational Maintenance/Aviation Unit Maintenance

F – Direct Support Maintenance/Aviation Intermediate Maintenance

H – General Support Maintenance

c. Column 3 - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4 - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply code for Manufacturer (FSCM) in parentheses followed by a part number.

e. Column 5 - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition of the lowest unit of issue that will satisfy your requirements.

SECTION II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM		(5) UNIT OF MEAS
1	C	5970-00-816-6056 or 5970-00-419-4291	HH-I-595B1080 MIL-I-24391	INSULATION TAPE, ELECTRICAL 81349	FT
2	C	6850-00-880-7616	MIL-S-8660C	SILICONE COMPOUND 81349	OZ
3	C	9505-00-293-4208		LOCKWIRE (SAFETY WIRE) 30889	EA
4	C	5330-00-905-6032	S91	O-RING 80063	EA
5	C	7516-00-290-8036	PPP-T-0097	PRESSURE SENSITIVE TAPE, FILAMENT REINFORCED 81348	YD

GLOSSARY

A ABBREVIATIONS

ac	alternating current
ANT	antenna
ANT CONT	antenna connector
AUX	auxiliary
CEOI	Communication Electronics Operation Instructions
C-E ORG MAINT	Communications-Electronics Organizational Maintenance
CHAN SEL	channel selector
dc	direct current
EMP	Electromagnetic Pulse
EPC	equipment performance check
fm	frequency modulated
HI	high
Hz	Hertz
IAW	In accordance with
INT	intercom
kc	kilocycles
kHz (was kc)	kiloHertz
LO	low
mc	megaHertz
MHz (was mc)	megaHertz
PWR	power
RAD TRANS	radio transmission
RETRANS	retransmission
rf	radio frequency
RT	receiver-transmitter
SPKR	speaker
SW	switch
Vdc	voltage direct current
VHF	very high frequency
VRC	vehicle radio communications
(*)	This symbol means all models of the equipment.

GLOSSARY – Continued

B DEFINITION OF UNUSUAL TERMS

ANTIJAMMING	Measures taken to minimize the disruption of communication by the enemy.
CIPHER MODE	Secure (scrambled) communications using VINSON COMSEC equipment.
CONFIGURATION	A combination of AN/VRC-12 Radio Set components installed in a specific way.
CONTROL BOX	A component located remotely from the RT which can be used to control communication and may provide a connection for audio accessories.
CRYPTOVARIABLES	The classified electronics information fed into VINSON or COMSEC equipment to give you secure communications (cipher mode).
DEMODULATION	The process in a receiver of removing an audio signal from the carrier frequency so that the audio signal remains.
DISTANT STATION	The radio equipment at the ends of a communications net.
DUPLEX	Simultaneous two-way communications between two stations. Like a telephone, transmitting (talking) and receiving (listening) at the same time.
ELECTROMAGNETIC PULSE (EMP)	A sharp pulse of radio frequency (rf) electromagnetic radiation produced by a thermonuclear explosion. EMP can damage unprotected electrical and electronic equipment.
FORWARD POWER	The strength of an rf signal from a transmitter radiated by its antenna.
FREQUENCY MODULATION	A type of radio transmission in which the frequency of an rf carrier wave varied in accordance with a modulating signal while the amplitude of the carrier wave remains constant.
HALF DUPLEX	One-way communications between two stations. Arrangement may permit operation in either direction (send or receive), but not simultaneously. Therefore, this term is qualified by one of the following suffixes: S/O for send only or R/O for receive only.

GLOSSARY – Continued

B DEFINITION OF UNUSUAL TERMS – Continued

JAMMING	The transmission of a strong or annoying signal on your frequency making it difficult or impossible for you to maintain communications.
MATCHING UNIT	A component of an RT antenna system which electrically matches the impedance of the antenna to the frequency at which the RT is tuned so that the antenna may radiate the rf signal with the greatest efficiency. May also be used to physically mount the antenna elements.
MUTING	Reduction of speaker output (loudness) to prevent acoustic feedback to an audio accessory microphone.
OPERATIONAL CHECK	A test or series of tests of a radio set which checks the performance of the radio set and its components under controlled operating conditions to determine combat readiness of the radio set.
ORIENTATION	Positioning of connected cables so that they do not interfere with other cables or crewmember activity.
RADIO SET	Any configuration of components installed in a vehicle which provide communication to station distant from the vehicle.
RELAY MODE	Automatic retransmission.
REMOTE CONTROL	The operation of the radio set by remotely located components.
RETRANSMISSION	The arrangement of two radio sets connected together to provide automatic retransmission of signals between two radios that are too far apart to communicate directly with each other.
ROUTING	Path taken by cables to interconnect a radio set within a vehicle.
SIDETONE	The sound of user's own voice heard in earphone or loudspeaker while speaking into microphone.
SIMPLEX	Communication that takes place in only one direction at a time between two stations. (Push-to-talk/release-to-listen.)

GLOSSARY – Continued

B DEFINITION OF UNUSUAL TERMS – Continued

SQUELCH	A receiver circuit which automatically turns the sound off when no antenna signal is present and turns it on when an antenna signal is present.
VINSON	The latest model of COMSEC equipment.
X-MODE	A mode of operation which provides for secure communication between stations.
150 Hz	Sound of squelch tone you hear in headset.
(*)	Symbol used when basic model number refers to all models of the equipment.

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3-10	3-3		3-1
5-6	5-8		
		F03	

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2^{o} IFF antenna lag rather than 1^{o}.

REASON: Experience has shown that with only a 1^{o} lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2^{o} without degradation of operation.

Item 5, Function column. Change "2 db" to "3db."

REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read, "Replace cover plate removed in step e.1, above."

REASON: To replace the cover plate.

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

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